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**JOURNAL**

*of the*

**AMERICAN**

**VETERINARY MEDICAL**

**ASSOCIATION**

UNIVERSITY OF CALIFORNIA

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1942



**NATIONAL  
DEFENSE  
ISSUE**

VOLUME C, NUMBER 778

**JANUARY 1942**

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## THE HEALTH OF ANIMALS AND THE FOOD SUPPLY

STEPPING UP food production requires supervision of the health of farm animals and of their nutrition, vigilance against the importation of foreign plagues, and prompt stamping out of native infections.

THEREFORE, the movement to procure and assign veterinary personnel for the armed forces and civilian population in such a way as to prevent dislocation of animal-disease control in either group should meet with universal approval.

**The Corn States Serum Co.**  
*Omaha, Nebraska*

# Journal of the American Veterinary Medical Association

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600 S. Michigan Ave., Chicago, Ill.

VOL. C

JANUARY 1942

NO. 778

## • NATIONAL DEFENSE ISSUE •

### A Message from President Jakeman

THE DECLARATIONS OF war involving the United States have united the nation. They likewise have united the veterinary profession. In this crisis our profession must prove to America and to the world that it can and will continue to meet the great responsibility of protecting the livestock industry and safeguarding food supplies of animal origin. Many veterinarians will be engaged in active military duties, others in home defense efforts. Fulfilment of these obligations requires organized effort through the American Veterinary Medical Association; it also requires that each veterinarian study his own particular field of endeavor and, in addition to his patriotic participation as a citizen, develop methods of making himself more useful to his community than ever before.

Among the emergency projects started in December are:

- 1) A study of the exact needs for veterinary service in areas where it is now insufficient or totally lacking, with a view to determining how it may be supplied.

- 2) A project to bring about the greatest possible utilization of practitioners in all state and federal disease-control work.

- 3) An effort to have a veterinary member on all state and county farm advisory boards.

- 4) Outlines prepared by the Committee on Public Relations containing suggestions

for talks by veterinarians before various civic and agricultural groups on subjects pertinent to the increased production program.

As mentioned in the December issue of the JOURNAL, the Office of Defense Health and Welfare Service in Washington recently appointed a Veterinary Subcommittee of the Procurement and Assignment Service. This committee met in Chicago on December 18 with similar committees of the American Medical and American Dental associations to correlate plans for mobilizing the personnel of the three professions for both military and civilian needs. For our part in this work, every veterinarian in the United States is to be surveyed by questionnaire in order to obtain information needed by the government. State veterinary preparedness committees are to be organized and a veterinary member is to be appointed to the corps area advisory committee in each of the nine Army corps areas. Thus, individual veterinarians, regional and state committees and the national subcommittee are all called upon to assist in organizing for the emergency.

To the end that happiness and satisfaction in a job well done may be derived from our profession's part in the war effort, I call upon every member to give his best, and am confident of the result.

(Signed) H. W. JAKEMAN, *President*.

# Our Small but Vital Profession at War: Our Implacable Duty

[AN EDITORIAL]

THE MOST CRITICAL moment of American history arrived to find our profession small and its work vital. When alert officials engaged in mobilizing the nation's strength perceived this fact, they sought the coöperation of the AVMA. They had discovered that our profession has achieved great things, but has bloomed unseen. Furthermore, the survey soon disclosed that our small personnel, all of the same educational origin, is scattered about in numerous pursuits unidentified as components of the veterinary service.

But the main discovery was that the veterinary service, in whatever form it was found to be operating, is implanted into the nation's affairs to safeguard the most vital implement of war—*food supply*: a fact long recognized by far-seeing veterinarians.

This is not the time or place to point out inherent defects, nor to scold and quarrel among ourselves, but the fact remains that an efficient veterinary service is vital to the very existence of our country—to the freedom we cherish. This being unassailable, unity of effort on the part of all members of the profession can no longer be safely postponed.

## OUR ANCESTRY IS WAR

Organized veterinary medicine in this country is the child of patriotism kindled in the hearts of veterinarians by gigantic conflicts of arms. The vanishing food supply of the 1860s gave us the AVMA, organized to curtail the impoverishing animal plagues that were snatching food from the mouths of the soldiers. The offspring were the early state associations of the 1880s and the U. S. Bureau of Animal Industry, which soon wrote brilliant chapters in American history. In 1879, a standard veterinary college education became the requirement for the veterinary service of the cavalry arm. Efforts to establish a veterinary corps were constant before the turn of the century. The semimilitary set-up of the Philippine Insurrection established

veterinary education and systematic animal-disease control in that insular possession. The Philippines became and remained veterinary-conscious. Rinderpest and other tropical diseases of farm animals were conquered. Its people are now helping to fight our enemies.

World War I gave us the veterinary-military service we now have. It is envied the world over for its original researches on equine diseases, for its regulations on the procurement and care of transport animals, and for its guardianship over the soldiers' rations. But that conflict had other less known repercussions. It gave birth to our present veterinary educational system. The advances from three to four to five years of college work and high-school entrance requirements were started by the Surgeon General of the Army in 1918.

Moreover, World War I transformed the AVMA from an impecunious *pauvre diable* to a society of greater numbers and affluence. The membership more than tripled and the surplus went from less than nothing to sizeable figures—about \$33,000, which was the first worthwhile surplus of AVMA history. The World War of 1914-1918 aroused a lot of slumbering patriotism which must now be rearoused.

Thus, the private veterinary colleges which provided the first quota of graduates, the chairs of veterinary science in the agricultural colleges and the present research laboratories of the experiment stations were so many "military necessities" which enabled the civilian population to be better prepared for the next shooting war. The interim between wars called peace is but the period of preparing for the next one. Man's that way and who is going to change him? Abundance of food in this country was brought about by fighting animal diseases—by fighting a battle of the useful sort.

The AVMA invites attention to its doctrines in this respect, to the resolutions it



has passed and the actions it has taken. If this ruthless attack of the Japs and Nazis finds us small in numbers, it also will find us proud of our achievements and ready for whatever comes.

#### RATIONING POPULATIONS

While vast, formerly well-fed populations are rationed at so many grams per day to ward off the coming of the tragic hour and increasing food production has become a slogan in our own country, the time has arrived for the American people to face facts concerning the mechanism of food production and quit taking abundance as a matter of course. It is particularly timely for our people to turn from the ravings of isolationists to study the gearing of the food-producing machine that prevents the raw material from being wiped out or seriously damaged by disease. And the time is here to stop fooling with the operations of veterinary medicine, forthwith. No group working under equal educational standards has had as much sabotage to overcome in the last 50 years as our profession. Yet, in spite of the hurdles set up in its way by powerful private and public agencies, it has a record of discipline and accomplishment that can now be tendered to the Commander-in-Chief of the Army and Navy for thoughtful attention.

The gift of the veterinary profession to the defense program are millions of farms and ranches free from the infectious diseases which reduce the food supply these provide. Our plea is for ways and means of improving our service and of curbing the sabotage of scientific veterinary medicine which has so much to offer toward the country's defense.

To the readers of the JOURNAL, the story of animal-disease control under the direction of the U. S. Bureau of Animal Industry and its state connections is hackneyed and needless to reiterate. But now that it's "all out" to save our freedom, it is natural to reflect over the defensive strength of the United States had the veterinary service not controlled the major infectious diseases of farm animals: foot-

and-mouth disease, tuberculosis, pleuropneumonia, dourine, glanders, etc., etc. That the American people of 1942 would be but a warren of rabbits attacked by a pack of hungry wolves is exaggeration only to those who do not comprehend the potentiality of animal disease.

The veterinary service in the process of development has had its faults, but lack of achievement of the kind the nation now needs is not one of them. This is a warning—call it a scarehead if so inclined—based upon close contact with the American development—a warning to stop the quackish practices that would replace the orderly operations of scientific veterinary medicine. Rationing, hunger, undernourishment, pestilence, famine and disease galore is the price paid for neglecting animal diseases.

War is a terrible thing. There are no adjectives in the dictionary to describe its horrors. No pen has ever described it; no brush can paint it. Yet, here it is, for you to contemplate. Guard mount with you is not a mere military ceremony. You are guarding the greatest implement of war—food. How are you going to use your talent? Just make money on the higher price of livestock, or join with the organizations which have become a part of the national defense?

And remember this: War may become a propitious opportunity to revolutionize the social order under which you have labored. The group we now call the veterinary profession can be wiped off the slate should it lack the unanimous effort required to administer the kind of animal-disease control the American people are going to demand.

The worst that could happen to our profession is to be caught less than unanimously willing to fight our country's enemies. It will require time, money and work on the part of the Association and its central office to carry out the plans suddenly thrust upon it.

These words are written with profound reverence and sincerity, hopeful that building up the strength of the AVMA in the councils of our government will become Duty No. 1 to all of its members.

## The Procurement and Assignment Service for Physicians, Dentists and Veterinarians: Its Origin and Functions

IN ORDER THAT veterinarians may better understand the purpose and operations of the Procurement and Assignment Service as it applies to them, it is deemed advisable to publish the following information:

In principle, the object of this service is to aid the government in providing the armed forces with physicians, dentists and veterinarians and in maintaining adequate professional service for the civilian population and industries. This step was recommended in April of 1941 by the Subcommittee on Medical Education of the Health and Medical Committee, Office of Defense Health and Welfare Service.

On October 30, 1941, Federal Security Administrator Paul V. McNutt obtained the sanction of President Roosevelt to form a procurement and assignment service under the Office of Defense Health and Welfare Service. The President named a directing board headed by Frank H. Lahey, president of the American Medical Association, and four other members. Major Sam F. Seeley, M.C., U. S. Army, was named executive officer of the board under War Department orders.

Subcommittees were formed to represent medical education, hospitals, dentistry, veterinary medicine (*vide* the JOURNAL, Dec. 1941, pp. 513-514), industrial health, information, Negro health, public health and women physicians. The members of these subcommittees were appointed officially by the Office of Defense Health and Welfare Service.

### PRIMARY OBJECTIVES

One of the primary objectives of the Procurement and Assignment Service is to maintain a complete register of physicians, dentists and veterinarians for the entire country—listing age, physical condition, professional qualifications and availability for service in the military and civilian activity. The information will be tabulated

quickly for rapid selection of personnel needed. All departments of the government which utilize physicians, dentists and veterinarians will thereafter requisition the Procurement and Assignment Service for personnel. Arrangements are also being made whereby the Service will co-operate with the National Roster of Scientific and Specialized Personnel, which has basic data on professional men in many branches of science.

The organization of the Procurement and Assignment Service is now almost complete. Its central office is in Washington, D. C., and a regional office is being set up in Chicago to facilitate the work of the American Medical, American Dental and the American Veterinary Medical associations. Boards to act in an advisory capacity to the corps area commanders are being named for each of the nine army corps areas. These corps area boards will have four medical, two dental and one veterinary member.

At a meeting of this committee held in Chicago, December 18, 1941, the following were recommended for appointment as members of their respective corps area boards:

- First.*—R. W. Smith, Concord, N. H.
- Second.*—R. R. Birch, Ithaca, N. Y.
- Third.*—Mark Welsh, College Park, Md.
- Fourth.*—B. T. Simms, Auburn, Ala.
- Fifth.*—A. F. Schalk, Columbus, Ohio.
- Sixth.*—Ward Giltner, East Lansing, Mich.
- Seventh.*—H. D. Bergman, Ames, Iowa.
- Eighth.*—M. B. Starnes, Dallas, Texas.
- Ninth.*—C. M. Haring, Berkeley, Calif.

### THE CORPS AREAS OF THE ARMY OF THE UNITED STATES AND THEIR HEADQUARTERS

- First.*—Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island. Headquarters: Boston, Mass.
- Second.*—New York, New Jersey and Delaware. Headquarters: Governors Island, N. Y.
- Third.*—Pennsylvania, Maryland, Virginia and District of Columbia. Headquarters: Baltimore, Md.

*Fourth.*—Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi and Louisiana. Headquarters: Atlanta, Ga.

*Fifth.*—Ohio, Indiana, Kentucky and West Virginia. Headquarters: Columbus, Ohio.

*Sixth.*—Illinois, Wisconsin and Michigan. Headquarters: Chicago, Ill.

*Seventh.*—Minnesota, North Dakota, South Dakota, Nebraska, Kansas, Wyoming, Iowa, Missouri and Arkansas. Headquarters: Omaha, Neb.

*Eighth.*—Colorado, Arizona, New Mexico, Oklahoma and Texas. Headquarters: Houston, Texas.

*Ninth.*—California, Oregon, Washington, Montana, Idaho, Nevada and Utah. Headquarters: San Francisco, Calif.

The veterinarians selected by the Office of Defense Health and Welfare Service to act as members of the Veterinary Subcommittee are:

- H. W. Jakeman, president, American Veterinary Medical Association, Boston, Mass.
- Cassius Way, practitioner, New York, N. Y.
- John R. Mohler, chief, Bureau of Animal Industry, U. S. Department of Agriculture, Washington, D. C.
- W. A. Hagan, dean, New York State Veterinary College, Ithaca, N. Y.
- J. G. Hardenbergh, executive secretary, American Veterinary Medical Association, Chicago, Ill.

#### STATE COMMITTEES TO BE FORMED

At a joint meeting held in Chicago on December 18, the directing board of the Procurement and Assignment Service requested also the nomination of state chairmen representing the medical, dental and veterinary professions. Pursuant thereto, under date of December 20, a letter was addressed to all secretaries of state associations asking that their executive officers nominate a member as state chairman at once. When this has been accomplished, each chairman is to proceed to form a state preparedness committee acceptable to the officials of his association. It was suggested that the various branches of veterinary medicine be represented on these committees, *i.e.*:

- 1) The chief veterinary officer of the state.
- 2) Federal inspector-in-charge (of field work).
- 3) College-faculty member, or where no veterinary college exists, a member of the vet-

erinary science department of the state university, college or experiment station.

- 4) A member of the state veterinary examining board.
- 5) A practitioner.

The duties of these state preparedness committees can be given only in broad terms at this period of organizing this nationwide service. In general, the state committees will be charged with studying the personnel available for disease-control work, that is, to survey the community needs in veterinary personnel with increasing food production in mind; to insure that every veterinarian of the state fills out and promptly returns the questionnaire he receives; to aid in maintaining the civilian and public health needs for veterinary service; and to avoid serious dislocation of veterinary personnel on account of military requirements which might leave large areas without the service needed to control animal diseases; and to impress upon every veterinarian the importance of being alert and watchful for outbreaks of infectious animal diseases.

Since the veterinary profession has been charged with great responsibilities, it is important to exercise care in choosing members of state committees. Leadership, the ability to organize and willingness to sacrifice personal welfare are to be kept in mind in executing the task the government has placed in the hands of the country's veterinarians.

#### NEW INFORMATION REGARDING THE QUESTIONNAIRE

Just as this issue was going to press, the central office was advised to defer mailing of the questionnaires, since a coöperative arrangement may be made with the National Roster of Scientific and Specialized Personnel, maintained in Washington by the National Resources Planning Board, whereby the Roster office will mail out the questionnaires. As this arrangement has a number of advantages, it seems likely that the Board of Governors of the Association and the Veterinary Subcommittee of the Procurement and Assignment Service will approve the proposed collaboration.

Most veterinarians will recall receiving



a detailed questionnaire last year from the National Roster. Although not fully adapted to the present emergency needs, the questionnaire did enable the Roster office to compile basic data on about 8,000 veterinarians. The National Roster officials now, through an agreement to be consummated with the Procurement and Assignment Service and other agencies, have offered to make available to the medical, dental and veterinary agencies concerned certain facilities and records which will be useful in completing surveys now under way and in exacting the greatest possible service from additional surveys that may be made of physicians, dentists and veterinarians.

Accordingly, instead of the questionnaires being mailed out from the AVMA office in Chicago, it now seems likely that they will be sent out from Washington. The returned questionnaires will also be coded there and subjected to further statistical preparation and the resulting information made available to the AVMA office and the Veterinary Subcommittee.

We urge every veterinarian to respond promptly when the questionnaire arrives. Our profession has been asked to lend its strength and coöperation to help meet the nation's critical needs. The Association, as the official body representing the entire veterinary profession, members and non-members alike, has been called upon to help in organizing the veterinary defense forces of our country; we must bend all of our efforts individually and collectively to discharging the responsibilities placed upon us. To do less would be a serious reflection upon our capabilities and our patriotism.

Please, therefore, when you receive your questionnaire, (1) *Read it carefully*, (2) *fill it out completely* and (3) *return it promptly*.

*[Publication of this number of the JOURNAL was delayed in order to include fullest possible information on the status of veterinarians in national defense, including last-minute changes in the procurement and assignment plans which were made at the time this issue was scheduled for press.]*

## Veterinarians Allowed Tires and Tubes Under New Rationing Program

Veterinarians are included in the first classification of those who will be allowed to obtain new automobile tires and tubes under the rationing program which will go into effect January 5, 1942. Others in this first classification whose services are deemed essential to health and public welfare are physicians, surgeons and visiting nurses.

Price Administrator Leon Henderson issued regulations on December 26 for local tire-rationing boards. These regulations ban the issuance of purchasing certificates for new tires or tubes except to those coming within seven distinct classifications, which are important to health, safety and industrial and commercial operations of a limited nature. The classifications are:

- 1) Physicians, surgeons, visiting nurses and veterinarians.
- 2) Ambulances.
- 3) Fire-fighting equipment, police vehicles, garbage trucks and mail cars.
- 4) Public service vehicles for ten or more passengers on regular transportation routes, school buses, or cars to carry workers to and from industrial plants.
- 5) Ice and fuel trucks; road-maintenance, public utilities and essential repair-service trucks; common carriers and transportation of raw material, facilities, etc.
- 6) Farm tractors and other implements, except trucks or pleasure cars.
- 7) Industrial, mining and construction equipment, except trucks or other automobiles.

As to the prohibition against sales of tires for use on cars delivering to consumers, it is said that there are factors to relieve any situation involving delivery of milk, bakery products and department store goods. It is hinted that the pooling of deliveries to avoid duplication of routes may be one solution.



# Personal Survey of Wartime Animal-Disease Control in Great Britain\*

A. EICHHORN, D.V.S.

Beltsville, Md.

*[The prompt publication of this paper and the one by J. Arthur Myers, which follows, was authorized by the officers of the United States Live Stock Sanitary Association on account of the current importance of the subjects.]*

IN AUGUST of this year a request was received by the United States government from the Ministry of Agriculture of Great Britain to delegate a specialist in animal-disease control to visit Great Britain for the purpose of discussing problems which might result in the adoption of measures for the control of infectious diseases of animals. It was my privilege to receive the assignment.

The responsibility for the control and eradication of infectious diseases in Great Britain is vested with an organization similar to the U. S. Bureau of Animal Industry. On the other hand, all research pertaining to problems in agriculture is administered by the Agricultural Research Council, which is responsible for the development of research projects and the allocation of such funds as are required for the execution of the projects. The Council appoints committees consisting of specialists who are known to have the best qualifications for research on the respective projects. Thus, committees for the study of Bang's disease, bovine mastitis, Johne's disease, tuberculosis, diseases of swine, etc., are functioning. They meet at various times for the purpose of discussing the problems and any new developments which might be advantageously taken up.

The opportunity was afforded the writer to attend conferences of several of these committees and, while research on many of the projects is necessarily lacking during this emergency, it is realized that efforts must be concentrated on disease control which will be of immediate benefit to

the livestock industry. Primary consideration, therefore, is given to diseases which have an influence on milk and meat production. In view of the fact, however, that the importation of animal feeds on which Great Britain greatly depended prior to the present war is very much restricted, all animals are maintained on rations which have to be greatly reduced or at least materially changed from the normal practice. Accordingly, the numbers of hogs and poultry have been greatly reduced. Although every effort is being made to maintain the number of milk-producing cows, the lack of food concentrates has resulted in a diminished production of milk. In order to provide the greatest possible supply of milk, the control of diseases influencing milk yield is being given primary consideration and, from available data, it appears that the reduction of milk yield because of Bang's disease and mastitis amounts to about 15 per cent.

## BANG'S DISEASE

Since the recognition of the infectious nature of Bang's disease, efforts have been made in Great Britain to control the infection. The first country in which large-scale vaccination with live organisms was instituted is Great Britain, the government having undertaken the production of vaccine without regard to the virulence of the organisms. This practice was abandoned after several years, although early reports indicated that a marked reduction in the incidence of abortion followed in cases where this form of vaccination was practiced. Unquestionably, the use of virulent organisms for that purpose tended to spread the infection and one could safely assume that the present extent of the dis-

\*From the Animal Disease Station, Bureau of Animal Industry, U. S. Department of Agriculture; presented at the forty-fifth annual meeting of the United States Live Stock Sanitary Association, Chicago, Ill., December 3-5, 1941.

ease in Great Britain might be due at least partially to the wide application of vaccination. It is now accepted that approximately 35 per cent of the herds in Great Britain are infected and no definite procedure has been adopted for the control of the disease.

The livestock sanitary officials, as well as the veterinary profession, were informed of the experiments conducted in the United States with strain 19, but aside from the limited experimental work, the use of vaccine has not been encouraged. More recently McEwen claimed to have developed a live vaccine from a strain which, although antigenic, did not induce an agglutination titer in the injected animals. Results of uncontrolled field tests published by McEwen and also experimental data seem to confirm this assertion and, based on these results, the committee on Bang's disease appointed by the Research Council has undertaken controlled experiments to establish or disprove the claims of McEwen.

During my visit to the experimental farm of the Agricultural Research Council at Compton, I had the opportunity of observing these experiments, in which ten young animals were vaccinated and ten left as controls under strict isolation. During the first pregnancy all were exposed to artificial infection. Of the vaccinated animals, one gave birth to a premature calf and in four of the others organisms were isolated either from the milk, afterbirth or discharges following parturition. Thus, it is evident that five of the ten animals shed infection following parturition.

After citing the results of the experimental work with strain 19 in the United States, in addition to the field results of the vaccination of approximately 20,000 calves, the authorities in charge of this project looked with favor upon calfhood vaccination with strain 19 and officially requested the U. S. Department of Agriculture to send and loan the British government a technically trained man to inaugurate the production of this vaccine. This request is now receiving the attention of the Bureau of Animal Industry.

#### BOVINE MASTITIS

Bovine mastitis has been studied intensively in Great Britain because of its prevalence and the great losses associated with its presence. The principal causative factor is recognized as *Streptococcus agalactiae*, although staphylococcus infections, while not as prevalent, are more destructive in their action. Several years ago Dr. Minett, who unquestionably was the foremost authority on bovine mastitis in Great Britain, developed a procedure for the control of the infection which, however, from the practical standpoint, has not gained much favor because of the extensive laboratory work involved. At the present time veterinarians are directing their attention principally to sanitary measures for the control of the infection. The difficulty in carrying out the measures required for this procedure is unquestionably responsible for the widespread prevalence of the disease.

From time to time chemotherapeutic agents have been employed, particularly acriflavin and entozon, but they have not been acclaimed as specific nor have they been proved sufficiently effective to justify their general application. More recently gramicidin has been employed experimentally in several herds with promising results and other newly developed chemotherapeutic agents also are being tested. Thus, the control of mastitis is at best largely limited to hygienic and sanitary precautions.

#### TUBERCULOSIS

As in most Central European countries, tuberculosis is widespread in Great Britain. It is estimated that 35 to 45 per cent of the animals are infected with the disease. In the past years efforts have been made to stimulate its eradication from milk-producing herds by offering a bonus to those who would agree to eliminate the infection from their herds. The bonus amounted to 2 cents on a quart of milk. As a result of this effort, many dairy-herd owners volunteered for participation in the program. Because of the present emergency, however, even this limited effort to

wards tuberculosis control is more or less abandoned.

Unquestionably, with the effort of increased milk production and the lack of proper feed, the incidence of tuberculosis will be on the increase and it is regrettable that human infection of the bovine type will unquestionably also increase proportionately, especially as in Great Britain pasteurization is practiced only to a limited extent.

It is indeed fortunate that the efforts in the United States towards eradication of tuberculosis have progressed to the present state where the control program has not only practically eliminated the danger of infection to human beings, but also has proved to be a great economic achievement.

A method of control based on vaccination is being considered and will depend upon the results of controlled experiments now in progress. In 1937, the discovery was announced by Wells that the English field mouse, or vole, is frequently found to be infected with tuberculosis. The acid-fast organism responsible for this disease peculiarly does not conform to any of the recognized types of tubercle bacilli. It does not cause progressive tuberculosis in guinea pigs or rabbits, but does produce a marked resistance to subsequent injections of virulent bovine or human tubercle bacilli. In preliminary vaccination experiments in cattle it was found that animals vaccinated in various ways with relatively large doses of the vole bacillus and subsequently exposed to virulent tubercle bacilli showed practically no lesions of tuberculosis in some instances when killed a few months later, while control animals showed extensive infection.

The writer viewed the cattle in the present vole-vaccine experiment in Cambridge, but it will be at least two years before the test is completed, as the authorities intend to allow some of the cattle to live two or three years to determine whether the disease is completely resisted or merely temporarily arrested. If the vole vaccine should prove effective, it may be feasible for the British, with their high incidence of bovine

tuberculosis, to practice this method of control.

#### HOG CHOLERA

Hog cholera has not been recognized in Great Britain as being as destructive as in the United States, although in the past few years it has gained in its extent, and the losses, especially since the present war, have increased. Because of the limited extent of the infection, the use of the simultaneous treatment has been prohibited and efforts have been made to control the infection either through slaughter or serum treatment alone, as has been the practice in Canada. The scientists, after learning of the discovery of a modified virus by Dorset and his coworkers, aim to follow the procedure in Great Britain and have undertaken large-scale experiments with the gentian-violet vaccine. The experiments carried out for the past few years are now practically concluded and vaccination of pigs by this procedure will be undertaken under field conditions within a short time.

Experiments have established that gentian-violet vaccine becomes "inactivated" about the third day of incubation and that the immunity following the injection of the vaccine is established by about the twelfth day. Furthermore, the vaccine retains its protective value after storage of at least 248 days when kept in the dark at room temperature, whereas at refrigerator temperature it appears to remain potent for years. Pigs of any age respond favorably to the vaccination. The experiments which were conducted on a large scale are sufficiently convincing to justify the authorities in permitting the application of the procedure for the prevention of swine fever.

In view of the importance of controlling swine diseases, the following information concerning studies of necrotic enteritis and swine fever might be opportune:

Studies on necrotic enteritis have demonstrated that the *Bact. suispestifer* is probably the most important factor in the development of the disease. In the experimental work it was aimed to determine the infective dose required to induce the disease and for this purpose groups of 5 to 10 pigs, aged about 9 to 12 weeks and kept on diets believed to be adequate in every way, have been given various doses of *Bact. suispestifer*.



tifer. It was found that 0.005 cc. (a little under 2 million organisms) of the strain of organism used caused a mild attack of the disease in 9-weeks-old pigs but very slight effect in 12-weeks-old pigs. On the other hand, 0.05 cc. usually caused severe disease in 9-weeks-old pigs but mild effects in 12-weeks-old pigs. 0.5 cc. caused very severe effects in 9-weeks-old pigs and mild to moderately severe effects in 12-weeks-old pigs. Age thus appears the more important factor affecting susceptibility, but there was also some indication that weight or age, good or bad mothers, and certain dietetic factors also played a part. The work has established that necrotic enteritis can be artificially set up by quite small doses in pigs on diets that appear to be adequate in every way, and appears to have provided a satisfactory basis for study of some of the other agencies which have a bearing on the susceptibility of the pigs. All experimental work with chemotherapeutical agents, including the sulfonamide preparations, has had no favorable effect on the course of the disease.

#### FOOT-AND-MOUTH DISEASE

With the widespread prevalence of foot-and-mouth disease throughout Europe, the infection appears periodically in Great Britain and causes a great deal of concern to the livestock sanitary authorities. Although the method of introduction has not been established in all cases, it is generally agreed that the importation of infected meat and meat products is responsible for the outbreaks. As a matter of fact, a recent survey showed that 50 per cent of the outbreaks occurred primarily in swine as a result of feeding uncooked garbage. Strict requirements for garbage cooking are now being enforced and it is hoped that through this effort the incidence of the disease will be materially reduced.

Efforts to eradicate the disease as soon as possible after its appearance resulted in the development of an organization which has proved very successful. Immediately upon report of a suspicious case, the veterinary authorities proceed with the slaughter of infected and exposed animals. Strict quarantine measures are inaugurated within given areas around infected centers and laboratory equipment is provided in various places for bleeding recovered animals in order to inoculate all animals surrounding the infected centers.

During this emergency, as many as possible of the animals are salvaged after slaughter, which, prior to the war, was not permitted; likewise, the burning of carcasses, which was the former practice, had to be abandoned because of the blackouts throughout the country, and at the present time the burial of carcasses is required.

The recent outbreak of foot-and-mouth disease in Ireland, particularly in the area around Dublin, resulted in prohibition on the importation of live animals to the British Isles. This restriction materially increased the meat shortage, as approximately a million beef animals were imported annually from Ireland to Great Britain.

#### FOOD RATIONING

Due to the shortage of food, a strict rationing system had to be established, especially with regard to meat and dairy products. It would require considerable time to describe the procedure which is followed by the Food Ministry in allocating and distributing the food supplies and, therefore, only a brief description of the method will be given here. All farm products are purchased by the Minister of Food and allocated according to the demand in the different localities. The slaughter of food animals is limited to 800 establishments (prior to the war, 25,000) and shipped to the distributing centers. Each shop has registered all of its customers and they are compelled to trade in that one store only. Apparently this practice has given excellent results, as customers have no difficulty in obtaining their allocated rations.

Foodstuffs rich in proteins, particularly meat, eggs and cheese, are principally rationed, because of restricted importation and reduced numbers of food-producing animals within the country. The effort to increase production of grains has necessitated the plowing up of pastures and has resulted in the maintenance of numbers of animals on reduced pasturage or in the slaughter of animals which could not be maintained under these conditions, both tending to reduce the normal milk supply. The reduced importation of animal feeds,



TABLE I—Net Imports and Estimated Consumption of Animal Feedstuffs Other Than Those Wholly Home Produced\*

Annual Average for the Three-Year Period 1934-1936 (in Thousands of Long Tons)

COMMODITY	TOTAL CONSUMP- TION	NET IMPORTS		HOME PRODUCED	
		QUANTITY	PERCENTAGE OF TOTAL SUPPLIES	QUANTITY	PERCENTAGE OF TOTAL SUPPLIES
Wheat (for feed)	1,150	257	22.3	893	77.7
Wheat by-products	2,290	2,090	91.3	200	8.7
Barley and barley meal	795	563	69.9	243	30.1
Oats and oat products	1,926	110	5.7	1,816	94.3
Corn and corn meal	3,215	3,215	100.0	—	—
Other cereals and cereal products	420	340	81.0	80	19.0
Oilseed cake and meal	1,519	1,519	100.0	—	—
Molasses	254	176	69.3	78	30.7
Other animal feedstuffs	75	75	100.0	—	—

which, prior to the war, constituted a large percentage of the total consumption, has interfered with the usual finishing of the animals for slaughter purposes. Table I shows the quantity of animal feeds imported by Great Britain prior to the war and which now, because of lack of facilities, is no longer available. The restriction of meat consumption, therefore, is apparent, and unless the shortage can be met by increased importation, the restriction will have to continue during this emergency.

Meat inspection, even prior to the war, was vested with the local boards of health, and especially in smaller communities such inspection was not conducted along modern lines of meat hygiene, being carried out in many instances by untrained lay inspectors. Only in larger cities has an efficient organization been maintained for systematic inspection based upon the latest scientific knowledge on this subject. It is only natural that in the presence of shortage of food even the existing regulations have been more or less neglected, a fact especially apparent in the distribution of milk when it was noted repeatedly that the individual family container was filled with a dipper from the can on a cart. It is, therefore, obvious that circumstances arising with the stress of emergency may readily affect established rules of proper hygiene and san-

itation and it behooves us to recognize such possibilities in advance of any emergency with which our country might be confronted.

Considering the reduced diet and the crowded living conditions in shelters and in emergency quarters, the very limited occurrence of human infectious diseases until the present time is striking. No serious epidemics have developed, which speaks well for the splendid functioning of the health authorities in this emergency. A considerable number of cases of so-called food poisoning, mostly of a paratyphoid nature, have been reported, which might be attributed to the desire of conserving "left-overs" without proper facilities for storage.

The veterinary profession is doing its part in the effort to safeguard the health of the animals and has been very successful in its efforts to minimize or prevent any great losses from the ravages of infectious diseases. Its members recognize the importance of their services and have repeatedly received commendations on their work. It is hoped that the splendid efforts to improve breeds, which always has been the primary aim of the livestock industry of Great Britain, will be continued and that after the conflict it will be possible to re-establish the great livestock industry of Great Britain.

# Bovine Tuberculosis Eradication in the United States and Its Resulting Beneficial Effects on Human Health\*

J. ARTHUR MYERS, M.D.

Minneapolis, Minn.

IN THE ENTIRE history of tuberculosis control, there is no accomplishment which even approaches that of the veterinarians and their allies in the United States. There are not sufficient superlatives in the English language to adequately describe your accomplishments and pay the tribute that you deserve. In reviewing much of the literature by men and women who advocated the control of tuberculosis in cattle, one finds a constant predominant aim, namely, to protect human beings against the bovine type of tubercle bacillus.

For centuries it was strongly suspected that scrofula or consumption of cattle was transmissible to man. After Villemin, Chauveau and Gerlach proved that tuberculosis is transmissible from animal to animal, Koch discovered the tubercle bacillus, Theobald Smith described the bovine type and Ravenel proved conclusively that this type causes tuberculosis in man, there were a few unbelievers and doubters, but for the most part the veterinarians and their allies possessed that admirable quality of accepting facts established scientifically in the laboratories and discarding whims and personal opinions. From this came the greatest victory ever won over tuberculosis. It included the solution of one of man's greatest economic problems and also the solution of one of his most serious public health problems.

It has been said that when Jenner introduced a practical and safe method of vaccination against smallpox, he added four years to the span of man's life on the earth. When the final analysis is made, it may be truthfully said that the control of tuberculosis among domestic animals, par-

ticularly cattle, has had an equal effect on longevity.

All tuberculosis in the human body begins in a microscopic way. When the organisms first enter the body, the tissues are not sensitized and, therefore, the reactions to them are nonspecific. These organisms are phagocytosed by white blood cells in essentially the same manner as other organisms and even inanimate material of the particulate type. These are focalized at one or many places in the body, where tubercle formation occurs. During the first few weeks of the development of tubercle, the tissues of the body become sensitized to tuberculo-protein so that the individual reacts to the tuberculin test in a characteristic manner. All of this is brought about by the bovine type in the same manner as the human type of tubercle bacillus. There is no doubt that large numbers of human beings of all ages formerly developed primary tuberculosis from the bovine type of tubercle bacillus and this markedly increased the incidence of tuberculin reactors wherever human beings associated with tuberculous cattle or consumed the products of these animals.

*Thus, the rapid decline in the incidence of tuberculin reactors among children of this country in the past ten or fifteen years is probably due more to the protection you have afforded them against the bovine type of tubercle bacillus than any other single factor.*

The development of primary tuberculosis complexes in the human body results in allergy, which sets the stage for specific reactions to tubercle bacilli, and these may result in clinical tuberculosis. This is easily demonstrated by introducing a measured amount of tuberculin, let us say 2 to 5 mg., into the layers of the skin of a child or an adult who has not been infected with

\*From the Medical School, University of Minnesota; presented at the forty-fifth annual meeting of the United States Live Stock Sanitary Association, Chicago, Ill., December 3-5, 1941.

tubercle bacilli. No reaction whatsoever occurs, but if the same amount of tuberculin is introduced into the layers of the skin of an individual whose tissues have become sensitized from primary tuberculosis, an intense, specific reaction occurs. The tuberculo-protein which the tuberculin contains is a deadly poison to the allergic tissues. It actually causes necrosis of the skin and later the dead part sloughs out. There is a similar occurrence when tubercle bacilli find lodgment in allergic tissues. Foci of these organisms become manufacturing plants of tuberculo-protein, which is a deadly poison to the adjacent tissues. Necrosis occurs, and if the lesion is in the lung, the necrotic tissue is likely to find its way into the ramification of a bronchus and a cavity is left in the lung.

The source of the tubercle bacilli which cause destruction of tissues may be either endogenous or exogenous; that is, the bacilli may come from lesions of previously established primary complexes or from outside sources through exposure to persons or animals who have tuberculosis in the contagious stage. The allergy which makes the development of the clinical type of tuberculosis possible in the human body may be established by the bovine type, as well as the human type, of tubercle bacillus. Thus, by protecting them against the bovine type of tubercle bacillus you have prevented the stage from being set for this destructive form of tuberculosis in large numbers of human bodies.

*It is probably this protection you have afforded, more than any other factor, that is responsible for the sharp decline in tuberculosis morbidity and mortality in the United States during the past ten or fifteen years.*

There can be no doubt that in the past much of the tuberculosis that caused illness and death of human beings in this country was due to the bovine type of tubercle bacilli. In fact, in 1910 Park estimated that in about 10 per cent of all infants dying from tuberculosis, the bovine bacillus was responsible. He later reported that from bacteriologic examinations 66 per cent of fatal generalized tuberculosis

in children was found to be due to the bovine bacillus. In 1914, Mitchell studied cervical lymph nodes of 72 children and 8 adults who were treated surgically for tuberculosis and found the bovine bacillus was responsible for the disease in 65 of the children and 6 of the adults.

Since accurate typing of tubercle bacilli has been possible, the seriousness of the bovine type of tuberculosis in man has been better appreciated. For example, in 1937 Dr. A. Stanley Griffith of Cambridge University pointed out that in England 50 per cent of the cases of cervical lymph-node tuberculosis and 50 per cent of the cases of tuberculosis of the skin were caused by the bovine type of tubercle bacillus. Moreover, approximately 25 per cent of the cases of tuberculous meningitis and 20 per cent of the cases of tuberculosis of the bones and joints and genito-urinary tract, respectively, were due to this type of organism. He estimated that 6 per cent of all deaths from tuberculosis among human beings in England were caused by the bovine type of tubercle bacillus, that 2,000 deaths occur annually and at least 4,000 new cases develop each year among humans in that country. In Germany Lange reported somewhat lower, but still appalling, figures.

For a long time it was thought that chronic, pulmonary tuberculosis in man was almost never caused by the bovine type of tubercle bacillus; in fact, only four such authentic cases were reported prior to 1922. However, when special investigations were made, such cases began to come to light, and by 1937 Griffith reported 163 such cases in Great Britain alone. He found that it is impossible by the clinical course of the disease or by x-ray film inspection to differentiate between the pulmonary lesions in man caused by the human and the bovine type of tubercle bacilli. Sizeable numbers of cases of pulmonary tuberculosis in man due to the bovine type of tubercle bacilli have been reported in other countries, such as Denmark, Holland and Sweden. Hedvall of Lund, Sweden, in reporting 65 cases, stated that the only way to distinguish between those caused by the human and the bovine types of bacilli



is by typing the organisms. He stated further that there is reliable evidence that bovine tuberculosis can be transmitted from cattle to man, from man to man and from man back to cattle. He found that the bovine type of tubercle bacillus causes just as serious disease in man as the human type.

In this country the individual who becomes infected with the bovine type of tubercle bacillus is rapidly becoming a rarity. You have almost put an end to the teaching facilities for this disease in the schools of nursing and medicine in the United States. Fifteen years ago we could select from our tuberculosis clinics almost any day excellent cases from which to teach our students. Today these cases are so rare that many months may pass without one appearing in our clinics. At the University of Minnesota we have a small list of names of such cases and we actually send for and pay them to allow us to demonstrate their cases to students and graduates in nursing and medicine. Already we have made photographs of these individuals, for we know that the time is near when this type of tuberculosis in man must be taught from pictures rather than from living patients.

*The control of tuberculosis in cattle, therefore, has markedly reduced the incidence of tuberculous infection, the morbidity and the mortality from tuberculosis in man.*

#### VETERINARY ACHIEVEMENT POINTS PATH TO HUMAN TUBERCULOSIS CONTROL

Your second great accomplishment is that you have taught those working in human medicine many valuable lessons. Indeed, you have pointed the way for the control of tuberculosis in man caused by the human type of tubercle bacillus. The following facts are only a few of the large number which you have demonstrated beyond doubt and which can be used to great advantage in controlling tuberculosis in man:

1) The tubercle bacillus is not ubiquitous. We now know that this organism is not present in the air or anywhere else

except in the immediate surroundings of persons with the disease in the contagious stage.

2) A brief exposure (a few minutes) to a person with contagious tuberculosis may suffice to transmit the disease to previously uninfected persons. The old idea that a long, intimate contact exposure (months or years) is necessary is obsolete.

3) You have shown that tuberculosis is not an inherited disease, that it is always a result of contact exposure.

4) You have shown that in animals contagious tuberculosis is nearly always a disease of adult life. Only a few years ago the child was the center of attraction among tuberculosis workers, but today the activities have shifted to adults, since we have learned from your experience that contagious tuberculosis exists in the body of a child with extreme rarity.

5) You have demonstrated the great importance of quarantine of tuberculous animals at our ports of entry, international borders, our state and county borders, and even farm lines. Since you have done this so effectively, it has become obvious that quarantine must be used in a similar manner to prevent tuberculous persons from spreading their disease to other human beings and animals. You also have protected other nations against our tuberculous cattle, and we must do likewise with human beings by demanding adequate examination before issuing passports.

6) You have demonstrated that attempts to produce artificial immunity have resulted in disappointment and have proved that all methods tried to date have been of no avail. There are still a few persons in the field of human medicine propagating for the general administration of immunizing agents. They have no firm foundation on which to stand. Your demonstrations in this connection afford us the best evidence with which to combat such propaganda.

7) You have demonstrated beyond all doubt the best method of administering tuberculin (intracutaneous) and have proved for all time the specificity of this test. The volume of work done on the tuberculin test exceeds that of any test for



any other disease. Your evidence for the specificity of the test is so overwhelming that every open-minded person who takes the time to listen or read, and actually thinks, must accept it. Despite these facts, in reviewing the literature on the control of tuberculosis among animals, I have noted with considerable disgust that an occasional person rose up in condemnation of the tuberculin test. One would think that such thoughts had vanished from the human mind long ago and, yet, I read in the October 16, 1941, issue of the *Milwaukee Sentinel*, a large headline, "Revision of T. B. Tests Is Recommended," with a subline, "Scientific Paper Is in Favor of Abandonment." The authors of the article to which this newspaper referred are said to have made the statement that confidence in the tuberculin test has been shaken by the fact that here has been no apparent decrease in the percentage of reactors after years of intensive segregation of infected persons and cattle. The trend now, they said, is toward abandonment of the test as applied to human beings. Many factors are concerned in this trend, they said further; probably the most potent is the economic one, for it is felt that when the major part of any group is likely to react to tuberculin, it is cheaper to x-ray the number than to test the group and then to x-ray.

If these statements are true, one wonders where these authors have been for the past decade. Have they failed to keep informed or do they belong to that group which always refuses to accept the truth? Have they not seen or accepted the splendid accomplishments of the veterinarians as reported by the United States Bureau of Animal Industry, showing the marked reduction in the number of reactors among cattle in this country? Have they not seen the postmortem reports, giving irrefutable proof of the marked reduction in slaughterhouse losses from tuberculosis in cattle? Have they not observed the tumbling down of incidence of infection, morbidity and mortality from tuberculosis among the human family in parts of this country where

vigorous tuberculin-testing campaigns have been in effect?

This newspaper article emanated from Madison, Wis. Is it possible that residing in Madison they have not learned of the fine and successful tuberculosis campaign conducted by the late Dr. R. H. Stiehm, always beginning with the tuberculin test, among the students of the University of Wisconsin? Is it possible they have not learned that tuberculosis committees of great national organizations, such as the American Academy of Pediatrics, the American Student Health Association and the American School Health Association, strongly recommend the tuberculin test for all students and faculty members of the schools, colleges and universities of this country? Is it possible that these authors would omit the tuberculin test in the future campaign against bovine tuberculosis and permit the wily tubercle bacillus to regain its former foothold and resume its terrible destruction of animal life and cause suffering and death of large numbers of human beings?

In the field of tuberculosis in man at the present moment, there are some persons who are creating confusion with reference to the method of administering the tuberculin test and others who are outrightly condemning it. This is because of such factors as inexperience, jealousy and lack of knowledge of the fundamentals of tuberculosis. Such individuals know that the test has an error of approximately 3 per cent. They take this insignificant error and make of it what seems to them a serious problem. On this basis they condemn the test, completely ignoring its 97 per cent efficacy. Such persons speak frequently and loudly; in their ignorance they think they have established a new fact, when in reality the fact they are emphasizing is within a few months of the age of tuberculin itself.

True students of tuberculosis in man are unanimous in support of the tuberculin test as the first step in the examination of any individual for tuberculosis. They know that all other methods of examination, including the x-ray film, are so limited in

their scope and are so crude that with them alone tuberculosis could not possibly be controlled, but with a delicate chemical test, such as we have in tuberculin, tubercle bacilli can be sought out with great accuracy in the bodies of human beings. These are the persons who already have, or may have at any time, clinical tuberculosis. True students of tuberculosis in this country recommend the omission of the tuberculin test only when working in areas where nearly 100 per cent of the population is infected. These areas, however, have become rare and are limited in extent.

8) You have taught us to attack tuberculosis on the area plan, using the county as the unit. For example, the Tuberculosis Committee of the Minnesota State Medical Association is developing a statewide campaign against tuberculosis. It has selected the county of Meeker as a demonstration area, where the following procedures are in effect:

a) The testing with tuberculin of all citizens of the county, regardless of age. This is screening out those who have living tubercle bacilli in their bodies and, thus, are potential cases of destructive forms of the disease.

b) Making x-ray film inspection of the chests from standard 14"x17" films to determine whether there are any gross lesions that might be due to tuberculosis, in the 75 per cent of the lungs visualized.

c) Careful examinations of those who have shadows on their x-ray films to determine the cause of the diseases that cast the shadows.

d) Immediate treatment of those who have reinfection type of disease in the pre-contagious and pre-symptom stage.

e) Immediate isolation of those found to have disease in the contagious stage.

When the work began in Meeker county, it was estimated that approximately 25 per cent of the entire population would react to tuberculin. However, in the 5,600 persons already tested, only 15 per cent were found to react. Of the 800 reactors who had x-ray films of their chests, together with other phases of the examination, eight were found with significant clinical pul-

monary tuberculosis. Thus, in this 800, there remain 792 whose chests are apparently clear at present. Each one of them is a potential case of clinical tuberculosis at some subsequent time; therefore, they need to be reexamined periodically. Some of them will develop the type of tuberculosis which will become contagious if undetected and untreated. Since there is no way to determine in which of the reactors this will occur, the only safe procedure is to reexamine all periodically. This makes our control procedures time-consuming and expensive. Moreover, it is not as promptly effective as your procedure.

One worker in the x-ray field has stated that an x-ray film of the chest is comparable with a postmortem examination. Of course, such a statement is ridiculous in the extreme, because: (1) A single x-ray film of the chest includes an inspection of only 75 per cent of the lungs and it is a poor inspection at that because it is not focused at different levels and, therefore, many changes in the tissues in the part of the lungs visualized escape attention; (2) lesions must be gross in order to cast significant shadows on the x-ray film; (3) one can not determine the etiology of a lesion from the shadow it casts on a film; and (4) numerous clinical tuberculous lesions develop in parts of the body other than the lungs. Thus, it is obvious that we are extremely handicapped in detecting the location of tuberculous lesions in the bodies of tuberculin reactors because all of the phases of examination available to us combined are in no sense of the word comparable with a postmortem examination. However, when gross lesions are present in that part of the lungs which is inspected by x-ray film, they often cast shadows before they cause symptoms or abnormal physical signs and before they become contagious. For this reason we always use the x-ray film inspection of the chests of tuberculin reactors, not with the thought of sweeping clean, but with the hope of screening from a given population those who have gross disease that is near or already in the contagious stage. The expense of this procedure would have been

beyond the realm of physical possibility had the old costs of x-ray film work been permitted to continue. Fortunately, we now have a method of making excellent, standard-size x-ray films by a rapid method at a cost within the reach of everyone.

There are other methods of making miniature films of chests, but they are only in the experimental stage and it is questionable whether they will ever be as satisfactory and convenient as the usual standard-size films. The new, inexpensive, standard-size film has removed x-ray inspection of the chest from a luxury within the reach of only a few persons to a routine procedure available to all. Thus, an annual inspection of the chest of all tuberculin reactors in Meeker county can be made without great expenditure of funds. However, this serves only as a screen for those who have developed gross lesions since the last examination; all such persons should be completely examined to determine whether their disease is tuberculous.

This demonstration is being carried out so effectively in Meeker county that already the physicians in other counties are contemplating campaigns against the disease. The Committee is of the opinion, therefore, that the time is near at hand when the majority, if not all, of the counties will be combed for tuberculosis by the medical profession and their allies.

In our Meeker county demonstration the veterinarians have been of extreme value. They have full knowledge of the fundamentals of tuberculosis control and speak with authority, since they have practically eradicated tuberculosis from the cattle herds of that county.

9) The veterinarians have given us another procedure of great value, namely, the accreditation of counties. During this year the Tuberculosis Committee of the Minnesota State Medical Association procured from the State Department of Health the average mortality caused by tuberculosis over the past five years for each of the 87 counties of the state. They then decided to establish a standard by which a county might receive special recognition for its tuberculosis-control accomplishments. It

was decided that one part of the standard should be a mortality of 10 or less per 100,000 of the population and the other part should be an incidence of tuberculous infection, as manifested by the tuberculin test, not to exceed 15 per cent of the senior students in the high schools of the county. Lincoln county, Minn., was found to have an average mortality for the past five years of 5.5 per 100,000. Within the past six weeks the physicians in that county tested the senior high-school students and found an incidence of 7.4 per cent reactors. Thus, this county is now ready for special recognition and it is a great delight to us that on December 11, 1941, a large celebration is to be held in Tyler, Lincoln county, when the Minnesota State Medical Association, the Minnesota Department of Health and the governor of the state will officially recognize Lincoln as an accredited county. There are three other counties in the state which probably will meet the standards during the coming year.

By following your example, we believe tuberculosis in man can be reduced to a disease as minor as smallpox, diphtheria and typhoid fever. We have methods of treating pulmonary tuberculous lesions so that they are prevented from becoming contagious. We have institutions for isolating the more advanced and contagious cases. To take them from the home and isolate them in an institution seems as satisfactory as the slaughter of a tuberculous animal, as far as the control of the disease is concerned. Unfortunately, however, the isolation of contagious cases of tuberculosis has created an extremely serious problem among the personnel of the hospital or sanatorium. In fact, this is one of the most pathetic situations in the entire field of tuberculosis at the present moment. Large numbers of persons taking instruction in tuberculosis or devoting their lives to the care of the tuberculous in these institutions have lost their own health and many have lost their lives because no satisfactory provision has been made to protect them against tubercle bacilli.

Isolation of tuberculous patients also has



created a large financial problem. It is now costing the United States about \$75,000,000 annually to maintain institutions for the tuberculous. Although this is an expensive procedure, it is the only way to prevent the spread of the disease in homes and communities. In this respect the sanatorium has done effective work, but from the standpoint of controlling disease in the individual patient, not as much can be said. The mortality over a period of ten years after the disease is first detected is appalling and for advanced cases it is very little different from what it was a quarter of a century ago.

One of your members, Dr. W. H. Feldman, with his collaborators, has within the past year made the greatest contribution of all time to the chemotherapy of tuberculosis. For the first time in the history of man, tuberculosis in at least one species of animals has been controlled. It now seems more than possible that the drug he has used, made available under the trade name of "promin," may have a beneficial effect on human beings suffering from tuberculosis. Tuberculosis workers everywhere are eagerly waiting for further information on this subject.

You can afford much help in the control of tuberculosis in man by continuing to show that it is possible to keep tuberculosis among animals under control by the use of the tuberculin test.

You can also help us by constantly calling to the attention of the public your justifiable fear of uninfected cattle becoming infected from human beings.

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The synthetic vitamin, para-aminobenzoic acid, which prevents hair from turning gray, is off the drug market temporarily because toluene, from which it is made, is all being used in making TNT.

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As of September 1941, 100 lb. of pork (live weight) was equivalent to 14.7 bushels of corn, or 25 per cent more than the average for the 1920-1939 period. For cattle, 100 lb. represented 15.5 bushels of corn, which was considerably above the average.

## A Letter from France!

There is nothing more rare just now than a letter from France. We are separated from that popular playground by an ocean *sans bourne*. Quoting:

The students of *l'École Vétérinaire Militaire de Saumar*, which you veterans of the A. E. F. well remember, participated desperately in the defense of that city during the German invasion of June 1940. They were in the third and fourth years of their military service who were mobilized when the war started. They fought as combatants. As you know, Saumar is on the Loire.

The veterinary school at Alfort reopened courses in December 1940 which will end in August or September 1941.

Horses condemned for military service sell for \$300 to \$400 in the unoccupied zone. The type of horses France bought in the United States at the beginning of the war bring from \$600 to \$800, but few can be found.

Veterinarians are among the rare persons who can purchase gasoline for their cars, and those among the prisoners of the war are the first to be liberated by the Germans following the various negotiations. They are regarded as indispensable to the economic life of the country.

The writer promises further news as it becomes available, but expresses little hope that much information will come through. "Indispensable to the economic life of the country" is a far-reaching truism any time. In an all-out war, it is eight words of precious wisdom. Liberating veterinary prisoners so that they may return to their work on the farms is an example of Nazi efficiency which less thoughtful countries may not be able to overcome.

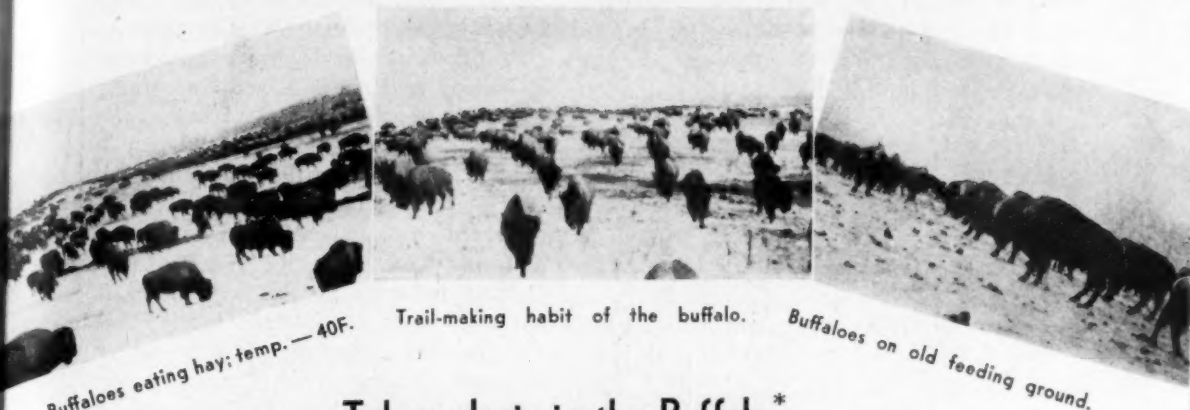
## Price Range of Certified Milk

The price of certified milk in large American cities ranges from 15 cents a quart in Memphis and Milwaukee to 22 cents a quart in New York City. The price averages between 5 and 8 cents a quart higher than common market milk. The price in Boston is 22 cents; Hartford, Minneapolis, Philadelphia, Pittsburgh and Trenton, 20 cents.

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Homing pigeons are cutting more of a figure in the present war than is generally known. Transport routes are in the air.





Buffaloes eating hay; temp. — 40F.

Trail-making habit of the buffalo.

Buffaloes on old feeding ground.

## Tuberculosis in the Buffalo\*

SEYMOUR HADWEN, D.V.Sc., F.R.S.C.

Toronto, Ont.

AN OUTBREAK of tuberculosis occurred in a large herd of buffaloes confined in the National Buffalo Park at Wainwright, Alberta.

### HISTORY OF THE HERD

The animals were mainly the descendants of the Michael Pablo herd of buffaloes purchased in Montana in 1906-1907. Altogether 631 were received from this source and 111 from different parts of Canada.

It is interesting to note that from 1914, when the last shipments were added to the herd, until 1923 there was apparently no outward indication of tuberculosis. A few buffaloes were killed for various purposes and one died under unusual circumstances.†

In 1923, as the herd was becoming too large, it was decided to kill off the surplus. Dr. I. Christian, Dominion veterinary in-

spector, was in charge of the meat inspection. Dr. A. E. Cameron, now veterinary director general, and myself were also present. On my return to Ottawa I submitted a report to the Parks Branch on the condition of the buffaloes, and later made suggestions about reducing the percentage of tuberculosis in the herd.

In 1939, sixteen years later, I was asked by the Department of Agriculture to re-inspect the herd and make recommendations as to its disposal. During this long interval no new animals had been brought in. The natural increase in the herd had been approximately 17,000.

The figures in the following table were obtained from the meat-inspection service through the courtesy of Dr. A. E. Cameron. Inspector A. W. Allan performed the post-mortem examinations on both buffaloes and deer in the final kill.

### COMMENTS ON THE PERCENTAGE OF INFECTED ANIMALS

As will be seen from table I, the highest percentage of infected animals occurred in the first three kills. These animals were the oldest in the herd, the majority being bulls. In the final slaughter in 1939, there was a marked drop in the percentage showing lesions. This is probably due to the fact that all ages were slaughtered, including calves and cows and a smaller per-

\*From the Ontario Research Foundation.

†Dr. Graham Gillam, Inspector in the Dominion Department of Agriculture, was called to examine a bull which died suddenly. The animal had been confined in a corral on account of sickness and the attendant who was feeding him lost all fear, thinking the bull too ill to be dangerous. The bull knocked him down one day and the last thing the man remembered was the hot breath of the beast on his face. When he recovered consciousness, he received another shock, for the bull was lying dead beside him. Dr. Gillam found a large splinter of wood lacerating the heart after having penetrated the paunch and diaphragm. The effort the bull made in attempting to gore the man had been his undoing.

TABLE 1—Tuberculosis in Buffalo Park, Wainwright, Alberta

BUFFALOES			
YEAR	NO. KILLED	NO. WITH LESIONS	% WITH LESIONS
1923	259	199	76.83
1927	1,012	733	72.43
1929	520	386	74.23
1931	1,534	915	59.64
1934	1,002	610	60.87
1936-7	1,522	1,005	66.03
1937	2,020	1,180	58.4
1938	1,226	545	44.44
1939	2,910	877	30.14
Total	12,005	6,450	

ELK, MOOSE AND DEER			
1940 Elk	952	59	6.19
1940 Moose	102	6	5.9
1940 Mule deer	242	2	0.83
1939 Elk	377	14	3.71
1939 Moose	5	0	0
Total	1,678	81	

centage of bulls than in previous kills. It is evident that from a meat inspector's standpoint, macroscopic lesions were less in evidence than in previous kills.

It is interesting to note that the elk, moose and deer showed a considerable degree of tubercular infection. They were wilder than the buffaloes and did not run in close association with them.

#### ORIGIN OF THE OUTBREAK

It is impossible to ascertain where infection started, but it would seem improbable that it came with the Montana buffaloes in the Pablo herd. This assumption is based upon the fact that a portion of this herd was liberated in another park in Alberta—Elk Island—where they have remained free from tuberculosis. In a kill of 800 animals, which took place in 1938-1939, not a single lesion was found. Numerous animals also have been tested intradermally by Dr. B. I. Love, superintendent of Elk Island Park, with negative results. We now have a herd of 1,200 buffaloes which is free from tuberculosis.

The most probable source of infection was the 111 buffaloes of Canadian origin. One of these herds was started by Mr. J. McKay of Prince Albert sometime prior to 1872, at which time it was sold. In an old record of this herd shown to me by Mr. A. G. Smith, superintendent of Buffalo Park, it is stated that the first captured buffalo calf was nursed by a domestic cow. Dr. C. H. D. Clarke of Ottawa informs me he has found in the early records of buffalo herds that the owners, through fear of inbreeding, exchanged calves. This dangerous practice appears to have been common and, doubtless, the calves would have to be given milk in transit or be fed by nurse cows. There is no need to speculate any further as to how the buffaloes acquired tuberculosis, except to remark that the same danger of infection from domestic cows' milk occurs frequently with deer and other wild animals in captivity.

#### SPREAD OF INFECTION AMONG BUFFALOES

The herd at Wainwright was kept on a fine, natural buffalo range of 197.5 square miles, surrounded by an unclimbable fence. The only contact with other mammals was through members of the deer family.

When I first saw the herd, I noticed that when hay was fed in winter it was scattered on the same ground day after day. This practice seemed likely to spread the disease and, moreover, as the area was not very large, it concentrated the animals at feeding time. A change was made and the hay was fed on clean, new ground. This, however, did not altogether prevent the animals from eating hay contaminated with fecal matter.

To reduce the number of spreaders it was recommended that the older buffaloes be slaughtered whenever possible. These recommendations were carried out, and although there was no marked lessening in the number of infected animals, a slight downward trend is indicated in the table.

As the percentages apply to postmortem examinations, the early or slightly affected cases could not be detected, except by other means. Therefore, when the figures ran

high, from 50 to 70 per cent, it can be assumed that a much higher percentage of the animals were actually infected.

About 1925-1926, 6,673 young buffaloes were shipped out of the Park to the edge of our northern barrens in Alberta. As they were young animals, it was thought that their removal might raise the percentage showing lesions, but apparently this did not occur.

These buffaloes were now in their old, native habitat, a dry sunny climate, although there were seasonal variations of dry and wet years. Generally speaking, they were well fed and got fat in the autumn, and a plentiful supply of hay was available in winter. When the herd grew too large for the available range in the Park, the surplus animals were slaughtered. The buffaloes were never housed or hunted, except for the annual round-up.

It would appear, then, that good, average food, rest and fresh air did not prevent the spread of tuberculosis among the buffaloes. This applies also to western range cattle, especially on the high plateaus between the Rockies and the Coast Range. Here I have made autopsies on fat cattle which showed generalized tuberculosis. Chances of becoming infected are brought about by close contact among the animals, resulting in many cases of tuberculosis in the buffaloes. Following infection the animals became tolerant to the disease and most of them lived to old age. The Park officials state that very few dead buffaloes were ever found on the range.

There is one final fact that should be pointed out in the table. The elk were more heavily infected than the deer. The most likely reason for this is that the elk, like the buffaloes, run in herds, whereas the deer are more solitary feeders.

#### LESIONS AND EXTENT OF DISEASE IN THE ANIMALS

At the slaughter in 1923, the lesions were similar to those seen in the abattoir inspection of cattle. Several generalized cases were noted. In my recollection, there were 18 carcasses condemned and sent to the tank. Among them several showed

"grapes" on the pleura. One noticeable lesion was found several times in the testes and was thought to be tubercular at the time. In the final inspection which I made in 1939, I watched carefully to see if I could detect such cases in the living animals. In a small herd I saw a bull which was bothering the other animals, and when he turned away from me, one side of the scrotum plainly showed an orchitis. The bull was shot and examined. One testis appeared normal, but the other was surrounded by at least a pint of a turbid, thin fluid. The testis was degenerating. No tubercle bacilli were found. In another case sent to me by Dr. Allan the results were similar. Guinea pigs and rabbits were inoculated and no evidence of tuberculosis was found. In sections made from the tissues, lesions suggestive of *Mycetoma* were encountered. Cultures failed to grow and animal inoculations were negative. It is, therefore, uncertain what organism is responsible for the condition. Dr. Allan reported that he saw several more chronic cases of orchitis not necessarily associated with tuberculosis.

At the request of the park superintendent, Mr. Smith, five lame buffaloes were shot to see if the joints or bones might be tubercular. Injuries and, in one, a broken femur were found. Muscular atrophy was noted, but no tubercular lesions. Numerous specimens were examined from both buffalo and deer. There were four generalized cases among the elk. Direct smears and sections revealed acid-fast organisms. Guinea pig inoculations were also successful.\*

A fact should be mentioned not connected with disease but relating to the longevity of buffaloes. During my visit to the Park

\*In a recent letter from Drs. Christian and Allan I have received confirmation for the above paragraph on lesions and some supplementary notes: At the 1923 slaughter the lesions were predominantly caseous; hence the infection was relatively new on that date. In 1939-1940, Dr. Allan found extensive calcified lesions of the throat and cervical and thoracic regions. The older the animals, the larger and more numerous were the calcified areas. No lesions were found in any buffalo under the age of one year. In the elk herd several healed broken bones were noticed, but in no case was tuberculosis present.



an old female, about 18 or 20 years of age, was killed. When I examined the uterus I found a small fetus. The Park officials relate instances where cows older than this have borne calves. I have seen this occur in animals which were not less than 35 years old. These facts have an important bearing on disease and also on the amazing fertility of the plains buffalo.

#### CONCLUSIONS

For more than 26 years a herd of tubercular buffaloes was maintained in a large enclosure in Canada. The disease did not interfere with the growth of the herd, which made considerable gains. The fact that buffaloes feed together and live in herds predisposes them to mass infection. In spite of good food, rest and fresh air, the disease in this herd persisted and would probably have continued indefinitely. There was no contact with animals other than members of the deer family. These readily acquired tuberculosis from the buffaloes, with the exception of the mule deer, of which only a small percentage became infected. The latter do not run in compact herds like buffalo or elk and eat different food, which would tend to keep them free from infection. The buffaloes in Elk Island Park serve as living, healthy controls for the Wainwright animals and now number over 1,200.

#### Penicillin: A Sensational Discovery

An important contribution to human knowledge is the rating given to the discovery of penicillin, a substance extracted from a germ-eating mould of the genus *Penicillium* by British scientists. The extract has germ-killing power in the living body far and above any germicide yet known. Though entirely harmless, however administered, it is microbicidal even in dilutions of one to a million. The "sulfa" drugs are not even close competitors, the reports declare.

The fly in the ointment is its scarcity. There is not enough in the whole world to supply even a tiny fraction of the demand. The discovery *per se* is, however, significant. *Penicillium* is the first living

pathogen of pathogens ever discovered. The hope lies in discovering a synthetic penicillin comparable with the synthetic vitamin fractions, such as thiamin chloride and ascorbic acid.

#### Those Bureau Salaries

A general practitioner of rural Dixie who can append "B.S.A., V.M.D." to his name writes: "Now is the time when labor and brains are rated high to appeal to the Bureau of Animal Industry, U. S. Department of Agriculture, to set the salary of junior veterinarians at \$3,000 and that of assistant veterinarians at \$4,000 a year. Your efforts would go farther than anyone else's in the world."

The JOURNAL is thankful for the compliment and wishes to assure this colleague (who is not connected with the government service) that no one is more anxious or more willing to bring about an increase in the pay of Bureau veterinarians than we of the AVMA's central office, for, as previously indicated, the rating of the veterinary service and of its personnel in all branches runs parallel to the salaries this group of veterinary technicians receives. The writer quoted above was inspired by the receipt of a letter from the U. S. Civil Service Commission asking, "Do you know a veterinarian who would be interested in government employment?" He adds, "I spent eight years in college to qualify for the job and I am offered \$2,000 a year provided I am able to pass the rigid physical examination."

A Bureau veterinarian who expects to mount above his initial salary rating must have the physique of an athlete, the education of a scientist, the sagacity of a diplomat, and the knack of keeping up with the Joneses without making bad debts.

Posted in local post offices throughout the country is an offer to "Home Economics Specialists" (women) to enter the government service at \$3,000 to \$5,600 a year. This is no challenge to the women of the HES group. They may be entitled to the salary offered, but these figures do prove that there are some loose bolts to be tightened up in the veterinary machine.



## Further Studies on the Significance of Suspicious Agglutination Reactions for Bang's Disease\*

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AN EARLIER PAPER, entitled "The Significance of Suspicious Agglutination Reactions to Bang's Disease,"<sup>1</sup> presented a review of the literature on the subject and reported our work done with suspects up to that time. The interpretation then made of the results was that most animals having a constant suspicious titer for Bang's disease are not dangerous and will not spread the infection in an otherwise clean herd. Further study, however, indicates that this conclusion was optimistic. This paper covers the continuation of the studies and includes the animals discussed in the first paper as well as additional ones which have since been studied.

As discussed here, a "suspect" is an animal reacting to the agglutination test for Bang's disease in the dilution 1:25 or 1:50. At the time our study was started, the United States Live Stock Sanitary Association (1931-1932) recommended that tests showing no reaction in the 1:25 dilution be called negative, that those showing an incomplete reaction in the 1:50 dilution be considered as suspicious and that tests showing reactions in 1:100 or over be called positive. The tests were made with test-tube antigen, which is 0.04 per cent bacteria in 0.5 per cent phenolized physiologic saline. Studies were made also of animals giving incomplete or complete reactions at 1:100, but showing no reaction in higher dilutions. The animals in this group were considered highly suspicious if incomplete

at 1:100, and positive if a complete reaction was given at 1:100. These animals were studied to determine the percentage of such animals which actually shed *Brucella abortus*.

Types of suspects encountered were discussed in the earlier paper and classified into three groups. The suspicious reactions may be due to (1) an ascending titer, (2) a descending titer or (3) a titer which may remain approximately stationary at the suspect level, with fluctuations to negative and back to suspicious, never going any higher.

If suspects are isolated and held in a herd for retest, disposition of the first two groups is relatively simple, as the animals become either positive or negative. The third group, however, which remain suspects, are hard to classify as to their true status. The animals may be truly immune cows which, when exposed to *Br. abortus*, show temporary low reactions that may disappear in time. Often a number of such animals will be found in a herd which has just become infected. On the other hand, such suspicious reactors may be found in otherwise clean herds when, as far as is known, they have never had contact with infected animals or any other source of infection. Such reactions are likely due to "native" agglutinating substances.

Suspects may be found, then, in infected herds as well as in herds which give no reactions other than the suspects. Thus it may be seen that a suspect in a positive herd may present an entirely different problem, as far as diagnosis is concerned, from a suspect found in a negative herd.

### MATERIALS AND METHODS

The present study has been in progress for twelve years. All of the animals were maintained in a separate experimental herd and

\*Paper No. 1914, scientific journal series, Minnesota Agricultural Experiment Station; contribution from the Division of Veterinary Medicine. This study was aided by a grant from the Bureau of Animal Industry, U. S. Department of Agriculture.

†Died January 11, 1940.

<sup>1</sup>Fitch, C. P., Bishop, L. M., and Boyd, W. L.: The significance of suspicious agglutination reactions to Bang's disease. J.A.V.M.A., xci (July 1937), pp. 22-44.

nearly all were studied for a period including at least one calving. Bacteriologic examinations were made of milk, colostrum, placentas and vaginal discharges to determine whether or not the animals were excreting *Br. abortus*. The possibility that the suspect class (1:25 to 1:50) might spread the disease to other animals was further checked by housing with them 34 negative pregnant and nonpregnant heifers. The 1:100 animals were not held with control animals, since they were considered positive; bacteriologic studies only were made on this group. It was assumed that such animals would spread the infection, and the study was made merely to determine what percentage were actually shedding *Br. abortus*.

The different groups were housed in separate barns, with only small paddocks available for outdoor exercise. Animals having similar titers were grouped together. Negative controls were housed with suspect animals and were allowed in the same paddocks. As a special protective measure, all animals were isolated at the time of parturition and not returned to the herd until free of any vaginal discharge and until rectal examination indicated normal involution of the uterus. Good stable hygiene was practiced throughout the experiment. The herd was bled at monthly intervals and the serum tested by the test-tube agglutination test for Bang's disease. Physical examinations were made to determine breeding conditions as well as general health.

Examinations of milk for the presence of *Br. abortus* were made on the average of every two months during the lactation period, and the colostrum was examined after each parturition. In every case samples were collected from each quarter of the udder in separate 500-cc. containers. The samples were then placed in the refrigerator for approximately 24 hours to allow the cream to rise to the surface. At least one guinea pig was inoculated with 4 cc. of gravity cream from each quarter of the udder. In most cases two guinea pigs were inoculated per quarter, making a total of eight pigs used for each milk or colostrum examination. The agglutination titer of the milk from each quarter also was determined by using whey obtained by adding rennet to a 5-cc. sample of milk.

The placenta was obtained from each calving. Small pieces of chorion and cotyledons were ground in a mortar and suspended in saline. With this saline suspension, cultures were made on gentian-violet plates (1:200,000 gentian violet) in addition to intraperitoneal inoculations into three guinea pigs.

If abortions occurred or if calves died shortly after birth, cultures were made of the lung, liver, spleen and stomach contents; two

guinea pigs were inoculated with stomach contents from the fetus and two others were inoculated with a saline suspension of lung tissue. Occasionally placental tissue was not obtainable for study, and in these cases vaginal swabs were made. If any abnormal vaginal discharge was noted, swabs were taken and soaked in saline, and the resulting suspension inoculated into guinea pigs. In some cases swabs were examined every three or four days for a period of two weeks following calving.

Postmortem examinations were made of 15 animals. These examinations consisted of direct cultures of tissues and the inoculation of guinea pigs.

All cultures of the materials mentioned were made on serum agar (5 per cent horse serum and infusion agar). If the material was contaminated, as in the case of placental tissues, cultures were made also on serum agar containing gentian violet in a 1:200,000 dilution. All cultures were incubated in an atmosphere of 10 per cent carbon dioxide for four days before being examined for growth. At this time all suspicious colonies were subcultured and the subcultures examined to determine the presence of *Br. abortus*.

All guinea pigs inoculated with milk or tissue suspensions were autopsied four to five weeks after inoculation. The spleen of each animal was cultured and the agglutination titer of the blood serum determined.

The technics described for direct culture of *Br. abortus*, as well as the guinea pig-inoculation method, have proved very satisfactory for the isolation of the organism from cows with agglutination titers over 1:100.

## RESULTS OF STUDY

A total of 136 animals have been studied. For the purpose of summarizing data these animals may be classed under two main groups.

*Group I.*—Thirty-nine animals came into the herd with 1:25 to 1:50 titers and maintained titers within that range, with the exception of two animals, in which the titers became definitely positive and from which *Br. abortus* was isolated. This group of animals was housed separately from the remaining 97 that were studied.

A total of 34 control animals were housed with the 39 suspects during the period of this study.

In addition to the two animals which developed positive titers and from which the organism was isolated, two controls developed positive titers and *Br. abortus* was isolated from them.

Animal 218 entered the experimental herd on September 20, 1932, and maintained titers

ranging from negative at 1:25 to incomplete agglutination at 1:50 until March 1, 1934, after which the titer rose slowly to 1:1,000 by April 25, 1934. The organism was isolated from this animal at the time of parturition, May 5, 1934. The animal was removed from the herd when the titer rose to 1:100.

Control animal 238, which was placed in the experimental group on March 14, 1933, maintained a negative titer at 1:25 with several titers of 1:25 until after parturition on March 1, 1937, when the titer increased to 1:1,000 by June 1, 1937. *Br. abortus* was isolated from the milk on April 9, 1937. This animal was removed from the herd when the titer rose to 1:100.

Control animal 331 entered the herd January 29, 1935, and maintained a negative titer at 1:25 with occasional (three) monthly titers at 1:25 until September 30, 1938, when the titer began to rise and rose rapidly. Parturition occurred on October 12, 1938, at which time *Br. abortus* was isolated. The titer rose to 1:1,000 on November 5, 1938. The animal was removed from the group when the titer reached 1:100.

Animal 261, which came into the herd on September 9, 1933, was placed in this group for study because an interesting relationship between the plate and tube agglutination titers had been observed. The tube agglutination test was negative at 1:25 and, with an occasional titer of 1:25, remained such until September 1, 1938, at which time the titer began to rise slowly. The plate titer at the time this animal entered the herd was complete at 1:100 and varied between incomplete at 1:50 to incomplete at 1:200 until November 1, 1935, after which the titer varied between complete at 1:25 to incomplete at 1:50, until September 30, 1938. Then the plate titer increased slowly along with the tube agglutination titer. *Br. abortus* was isolated from the milk before the titer reached 1:100 by both agglutination tests. This isolation of *Brucella* was four months after parturition. The titer continued to rise and rose to 1:1,000 by March, 1939. The animal was removed from the group when the titer reached 1:100.

Since control animal 238 became a reactor three years after 218, it is doubtful that this animal was infected by animal 218; and since control animal 238 became positive approximately two years before control animal 331 and animal 261 became reactors, it is doubtful if No. 238 was responsible for the infection of No. 331.

The agglutination titer of animal 331 began to rise shortly before that of 261, and since *Br. abortus* was isolated from this animal approximately a month before it was isolated from 261, there is a question as to whether this animal was infected by No. 261.

It is also questionable whether No. 261 carried an infection, as possibly indicated by the plate titers from the time of entry into the herd, and became positive five years later, or whether it was infected by No. 331 or some other animal in this group.

*Group II.*—Ninety-seven animals out of the 136 came into the herd with titers of 1:100 or incomplete at 1:100. These animals may be divided into three lots as follows:

A) The titers of 26 animals became lower shortly after they entered the herd, and they reacted in the 1:25 to 1:50 group. No animal in this group maintained its original titer for more than three months. *Br. abortus* was isolated from four animals in this group (128, 374, 411, 497). The organism was isolated once from each of three of them at the time the titers were 1:100, but never after the titers became lower. Number 128 was the only exception to this rule.

B) Fifteen animals with 1:100 titers maintained these titers for six months before they became suspects. The organism was not isolated from any of them.

C) Fifty-six animals did not maintain this high titer (1:100-1:100) for the entire time in the herd, but they never stayed permanently in the suspect class; there was always an occasional test at 1:100. With this variable agglutination titer, they could not be classified definitely as suspects. Two of this group (197 and 421) became definitely positive after more than a year in the herd. Two others (462 and 498) shed the organism more or less regularly. From animal 131 *Br. abortus* was isolated only once.

Doyle and Beckett<sup>2</sup> reported that they were able to isolate *Br. abortus* from the milk of cows with negative blood agglutination. This appears as a discrepancy between their work and ours, which may be due to the type of antigen used for the testing of the blood serum, for the sensitivity of an antigen plays an important rôle in determining the blood titers of animals. This leads to the supposition that these animals might have reacted positive if tested with a different antigen.

#### DISCUSSION

The actual isolation of *Br. abortus* from even so small a number of suspicious animals suggests that suspicious reactors

<sup>2</sup>Doyle, T. M., and Beckett, F.: The isolation of *Brucella abortus* from the milk of cows with negative blood reactions to the agglutination test. *J. Comp. Path. & Therap.*, xlix (Dec. 1936), pp. 320-327.



(titers of 1:25 or 1:50) may be a factor in the dissemination of brucellosis. At the same time, however, it must be noted that only 0.5 per cent of the suspicious reactors studied became positive. This very low percentage would, from all appearances, be of no serious hindrance in the present method of control.

The isolation of the organism from 9 (9.3%) of 97 animals which entered the experimental herd with titers complete at 1:100 or incomplete at 1:100 suggests that these animals may be a sufficiently dangerous source of infection to warrant their removal from a herd.

#### SUMMARY

At the time our study began, the United States Live Stock Sanitary Association (1931-1932) recommended that animals showing an incomplete agglutination reaction in the 1:50 dilution be considered as suspicious.

The suspicious reactions may be due to (1) an ascending titer, (2) a descending titer or (3) a titer which may remain approximately stationary at the suspect level and never be any higher.

During the course of our study, which covered a period of twelve years, nearly all of the animals were observed for a period including at least one calving.

Bacteriologic examinations were made of the milk, colostrum, placentas, vaginal discharges, fetuses and calves which died shortly after birth, to determine whether the animals were excreting *Brucella abortus*.

Agglutination titers of the blood and milk were determined at regular intervals.

Negative control animals were housed with suspect animals in each barn and were allowed in the same paddocks.

All animals were isolated at the time of parturition.

*Br. abortus* was isolated from two animals with suspicious agglutination titers and from two of the controls.

The isolation of *Br. abortus* from 9 (9.3%) of 97 animals which entered the experimental herd with titers complete at

1:100 or incomplete at 1:100 suggests that these animals may be a sufficiently dangerous source of infection to warrant their removal from a herd.

#### Trachoma

Trachoma, or contagious granular conjunctivitis, is a chronic infection of the human eye known to have existed since ancient times. There are about 50,000 scattered cases in the United States, not including some 25,000 cases among the Indians. The "trachoma belt" extends from Virginia to Kansas, pursuing an irregular course through southern Illinois, Kentucky, Tennessee and Missouri. Until developed, this disease is not easy to diagnose except by the history of contact with affected persons of a family. The infective agent is thought to be a virus, because figured organisms never have been isolated.

The malady has been pronounced incurable, although good results from the local use of copper sulfate are reported. Because it is painful, the copper treatment is hard to enforce.

Sulfanilamide, internally, is now being employed and prompt cures in the early stage have resulted. Cutter (*The Chicago Tribune*, Nov. 12, 1941) mentions the curing of about 50 per cent of chronic cases from the use of this drug. Granted that trachoma is a virus disease, these cures seem to upset the theory that the "sulfa" drugs are not viricides.

#### Ex Post Facto Testing\*

Undulant fever has become a public health problem of the first rank. Although not highly fatal, it incapacitates the victim for a long time and mainly affects adults having responsibilities depending upon their health. Speaking on that disease before the Canadian Public Health Association, J. S. Fulton, D.V.M., said, "It is unfortunate but true that the stimulus necessary to have cows tested is the development of human cases in the district."

\*From the Canadian Public Health Journal, April 1941.

## Some Swine Problems of the Future<sup>\*</sup>

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THIS SUBJECT WAS selected for the purpose of presenting certain phases of two diseases in swine which are at present, or will be in the near future, problems confronting the veterinary profession and others engaged in livestock sanitation and disease control.

The object is not to stimulate the research investigator, but to induce practitioners to be more observing and to make accurate records of their observations. It is hoped that they will make their records available to other practitioners as well as to those engaged in research and laboratory diagnosis.

It appears that the problems of swine-disease diagnosis and control are becoming more complicated each year. We have confronting us maladies resulting from various causes which we are able to classify at the present as infectious, either bacterial or virus in origin, parasitic or protozoan, and nutritional.

In order that we may more clearly understand the problems confronting us at present, and those anticipated for the future, it is felt that the use of comparisons will be advantageous. Therefore, in discussing swine erysipelas, comparisons will be made to hog cholera, and in presenting pig pellagra, similarities to and differences from infectious gastroenteritis will be pointed out.

### HOG CHOLERA

Hog cholera has been recognized in America for more than a century. The disease has been studied clinically, both in the field and under controlled experiments. The virus of hog cholera also has been studied by those in scientific research, but we still have much to learn about it.

<sup>\*</sup>Presented before the Section on Sanitary Science and Food Hygiene at the seventy-eighth annual meeting of the AVMA, Indianapolis, Ind., August 11-15, 1941.

The control of cholera is simple if the knowledge we have at hand is applied universally. We know what to expect from simultaneous immunization, and we have a fair knowledge of the epizootiology of the disease.

### SWINE ERYSIPELAS

Swine erysipelas has been known to exist in the United States for at least 50 years. During the greater part of this period the infection remained dormant and was not considered of much consequence among the infectious diseases of swine. About eleven years ago, however, the acute septicemic form broke out in the Middle West and since that time has spread to many states outside of this area.

During this short period much has been learned as to the means of diagnosis clinically, bacteriologically and serologically by the rapid agglutination test. We also have learned of the value of the specific antiserum and of prophylaxis with antiserum and the living culture. The use of the serum and culture has been confined to the State of Nebraska and certain parts of Iowa and South Dakota. Simultaneous prophylaxis is comparatively new in this country and every day the federal and state authorities engaged in this work are learning new factors which will be of vital importance in the future. The result of this coöperative experimental project, especially in Nebraska, has permitted the raising of young swine on farms where swine husbandry had ceased because of erysipelas.

If this disease loaned itself to the same methods of controls as other infections in swine, especially cholera, we could feel that it is now fairly well in hand or will be within a reasonable period of time. But erysipelas stands quite by itself in that it is insidious: It creeps in when least expected and may be present on a premises and in a herd long before it is recognized.

From this angle it is entirely opposite to cholera, which is readily detectable. As yet we do not know all of the different manifestations of erysipelas. The acute outbreaks are not difficult to determine and the formation of enlarged joints following an acute outbreak is easily recognized, but when we find young animals positive to the agglutination reaction and when we know that the animals have not manifested any type of clinical disturbance, it causes us to stop and wonder.

There has been a decided increase in the occurrence of enlarged joints in swine received at packing houses, particularly in the Middle West. Recovery of the erysipelas organism in these affected joints has been unusually high, but the astonishing part of the whole picture is the recovery of the organism from joints which show no gross pathologic changes.

Frequently inquiry is made as to how young swine, 2 to 5 days old, become infected with erysipelas. In order to clarify this point I will quote from a communication received in January from Dr. G. C. Holm, University of Idaho:

In a herd with which I have had close contact the following occurred. One sow with a blood titer over 1 to 1,200 farrowed eight pigs. Seven showed enlarged joints in two to five days. These pigs at the age of five to seven days showed positive blood titers of over 1 to 400. The pigs were posted and cultures prepared from the various organs and tissues. The organism was recovered from some of them, while in others our cultures were negative regardless of the fact that they all showed symptoms and joint lesions of erysipelas. The pigs were farrowed in a clean, disinfected pen and the navels were painted at birth. The milk from this sow proved negative when injected into pigeons.

Another sow had a blood titer of 1 to 800 and one pig developed the same joint lesions; on the sixth day there was a blood titer over 1 to 400 and cultures from this pig were positive. The milk from the sow was also negative.

On the basis of his observations and bacteriologic findings Dr. Holm states there is a possibility that these young pigs may have been infected intrauterine, although he questions the possibility of this organism passing through the placenta. Intrauterine infection has been suggested by Waller, recently of Iowa, and by European

investigators. This mode of infection or transmission is one of the problems we must solve if we are to control erysipelas.

The disease may enter unsuspectingly and remain for a long time without being recognized in herds that appear to have an attack of flu in the hot months of July and August. Shope states that swine flu is a disease of the fall, winter and spring months and that experimental transmission of the disease from May to September, during two summers, yielded only negative results. The checking of these so-called summer flu herds has in nearly all instances shown a considerable percentage to be reactors to the agglutination test for erysipelas.

Our discussion thus far has dealt with erysipelas as a disease entity. The organism itself is one of our stumbling blocks. This organism has been studied for years by foreign scientists, both in Europe and South America, but they have not set forth in literature the fundamentals of its physiology.

Two types of this organism have been encountered. The differences are in pathogenicity and antigenicity. The different strains do not have the universality of the different strains of cholera virus. In a few instances animals protected against erysipelas by the use of culture have been found to lose this protection when placed on other highly infected premises. Therefore, we do not have the assurance, as in cholera, that animals immunized in one state will be solidly protected against the infection which may occur in another state, or even in different areas within the same state. This erratic behavior of the organism is one of our research problems of the future.

It is common knowledge that the experimental production of erysipelas in swine is an exceedingly difficult task; in fact, to the best of my knowledge only one strain of this organism has been recovered during the past few years which would produce an acute septicemia when injected into swine. This culture was isolated at the Pathological Division of the United States Bureau of Animal Industry. According to



Dr. Schoening, chief of that division, the culture killed quite consistently for a number of passages in swine and then stopped.

The opposite of this experience was the recovery of an organism from sick and dying swine which was bacteriologically, microscopically and serologically identical to erysipelas, but not pathogenic for pigeons, even when injected in large quantities.

Those of us who have worked with this organism both in the laboratory and in the field have a feeling at times that factors other than the organisms must be present and are of vital importance in the beginning of acute outbreaks. What influence has the soil on the infectivity or pathogenicity of this organism? This question can not be answered at this time, but it is felt that the organism isolated from the tissues of animals, either sick or dead from erysipelas infection, is not always identical in all respects to the organisms contained in the highly infective soil.

Premises that become contaminated with the erysipelas organism will retain this contamination over a long period of time—10 to 20 years. Animals raised on such soil will exhibit various types of the disease. An acute outbreak may occur one year or possibly the second year; then for a number of years no acute outbreaks will appear. During these years there may be difficulties in producing normal growth in young swine. Occasionally an animal may die, but there will be no pronounced mortality at any given time. A few enlarged joints may be present and stiffness of gait noted. Autopsy of many of these animals shows no definitely diagnostic pathology. The tissues and organs may have a shrunken appearance and seem to be firm and pale. Bacteriologic examination of many such tissues reveals nothing of diagnostic value; the organism seems to have once been present, caused the damage and then disappeared. The blood will show some agglutinins. It is possible that the organism has secreted itself in an obscure tissue, which we fail to examine, and there remains dormant, so to speak, until a provocative stimulus is encountered which

causes it to be active once again. If one desires to determine the erysipelas factor in these herds, he should place a few thrifty young swine, from herds where the infection is not present, with this herd on these premises. It will not be long before acute cases occur which will not be difficult to diagnose.

Little is known about the epizootiology of this disease. The organism is known to be passed in the urine and feces. The tonsils probably play a part as regards carriers and possibly in the spread of erysipelas. It is not unusual to prepare scrapings and cultures from the normal, healthy looking tonsils, from apparently healthy swine, and recover the organism.

Provocative stimulus has been mentioned relative to the appearance of an acute outbreak of this disease. One can easily ask what these stimuli are, but it is difficult to give a definite answer to this question. Observations have shown, or at least so we think, that the concentration of infection present in the soil, hot humid weather, age, and possibly the lack of certain nutritive factors, such as certain vitamins and mineral elements, may singly or in any combination be the provocative stimulus. So little is known about this organism in nature that anything presented at this time would be only a guess.

#### PIG PELLAGRA

Pig pellagra is included in the problems of the future, not because it is new, but due to the fact that the apparent underlying cause has been recently found and the proper methods of treating are scientifically sound.

It is hoped that we will not become too enthusiastic about this disturbance and forsake our best judgment. This problem should be carefully studied by the veterinarian so that it will not be directed into the hands of the nutritionist.

In the study of swine nutrition it has been long recognized that certain vitamins, especially A and D, are necessary to maintain health and produce proper growth. Other vitamins, such as C and possibly B, were not considered essential. It was felt

that young, growing swine either did not need these last-named vitamins or were able to synthesize them.

During the past two or three years the literature has contained reports that clearly show these concepts to be erroneous.

In 1938, experimental work was reported, showing that young, growing pigs placed on a modified blacktongue- or pellagra-producing diet developed a disorder characterized by loss of appetite, anemia, dermatitis and diarrhea. Unless the diet was changed, the disorder was fatal. The affected animals were emaciated and had rough, scurfy coats with more or less severe dermatitis of the ears and body. On autopsy there were certain pathologic manifestations, especially in the gastrointestinal tract, but usually there were no changes in other organs.

Capillary hemorrhages were noted in the mucous lining over the greater curvature of the stomach, which extended also to the duodenum, and in a few instances this hemorrhage was noted in the posterior portion of the ileum. In the small intestine, near the ileocecal valve, there was a more or less extensive congestion and swelling of the mucosa, accompanied in some cases by shallow ulcers of irregular outline. Serious lesions sometimes were observed in the cecum and colon. They varied in extent from shallow, creeping ulcers at the base of the ileocecal valve to a diffuse necrosis extending over the whole mucous surface of the cecum and about two thirds of the colon.

On microscopic examination it was found that the mucous membrane, down to the muscularis mucosa, was converted into a coagulated mass of necrotic tissue, inclosing food particles and stained with bile. This necrotic layer swarmed with bacteria, including *Bacillus fusiformis* and spirochetes.

The lymph glands and the lymphatics draining the affected parts were swollen, edematous and often hemorrhagic.

Only nonpathogenic cocci, anaerobes and coliform organisms were isolated from the swollen lymph glands. These observations were interpreted to mean that the nutri-

tional defect had led to a diminished power of the mucous membrane of the cecum and colon to resist invasion by intestinal bacteria of low pathogenicity.

In 1939, Madison, Miller and Keith reported that a group of pigs on a farm in central Pennsylvania showed symptoms similar to those described as characteristic of pig pellagra. Nicotinic acid was given in quantities of 50 mg. daily in a minimum amount of feed. Within twelve days marked improvement was observed. The entire herd had completely recovered by the end of six weeks. This appears to be the first report of the recognition in the field of a condition which simulates experimentally produced pig pellagra.

In February 1940, Davis, Freeman and Madsen published a bulletin describing their experimental work carried over a three-year period (1936-1939). This bulletin is entitled "The Relation of Nutrition to the Development of Necrotic Enteritis in Swine."

The original experimental work was not instituted for the purpose of determining the relation of nutrition to the pathologic lesions referred to in the title. The primary experiment was a study of carcasses and weight gains in young, growing swine on rations made up largely of single grains.

During the course of this study it was noted that a considerable percentage of the animals stopped in their daily gains, had a disturbance of the skin and dermatitis, lost weight and developed diarrhea. Due to the resemblance to the picture described in the literature it was apparent that pig pellagra had developed. Nicotinic acid, liver and yeast were fed and recovery was remarkable. Further experiments were conducted with various cereal grains, under different feeding conditions. Their report shows that a component of the vitamin B complex is needed by young, growing swine, the same as had been reported, and that in all probability nicotinic acid was the particular fraction.

In the examination of these carcasses, which included especially the abdominal viscera, they noted apparently the same pathologic lesions of the cecum and colon

as reported by other investigators, but did not place the same interpretation on the lesions. The authors attempted to connect the lesions found in the digestive tract with an infection caused by *Salmonella cholerae-suis* (*Bacterium suispestifer*). The condition described, both from the clinical syndrome and pathologic lesions, is clearly pig pellagra.

This disturbance has been observed among young, growing swine for a number of years, and has been recognized as a nutritional deficiency, but was not connected in any manner to a vitamin B-complex deficiency. The addition of tankage to the ration has given satisfactory results; therefore, it has been considered by many that there existed a deficiency in animal protein.

Nicotinic acid and possibly other members of the vitamin B complex are present in liver, milk, lean meat, brewer's yeast, whole wheat and many vegetables. Tankage contains nicotinic acid and probably accounts for the favorable results.

The writer has reviewed all of the available literature pertaining to this condition and in no instance does any investigator report pathologic disturbances in organs other than the digestive tract. Nothing is mentioned about the enlarged and discolored spleen, high temperature, hemorrhages in the kidneys and the enlarged, succulent lymph glands throughout the body, all of which are constant in infectious gastroenteritis (salmonellosis). In one report in particular, the authors call attention to the fact that the pathologic changes in pig pellagra were confined entirely to the digestive tract and the adjacent lymphatics.

We are quite safe in saying, at this time, that we have two disturbances in young, growing swine that have some similar clinical and pathologic manifestations. One is infectious in character and the other nutritional in origin. Let us consider recognizing the infectious condition as salmonellosis, and the nutritional disturbance as pig pellagra. The differential diagnosis of the two disturbances is not difficult.

Salmonellosis (*Bact. suispestifer* infection) usually comes on suddenly, accom-

panied by a high temperature. The animal is quite active, the appetite is not greatly impaired and there is no dermatitis. On autopsy the stomach is well filled, with hemorrhage of the mucosa and quite frequently ulcer formation; the cecum and colon may be acutely affected with small hemorrhages of the mucosa and edematous infiltration. The spleen is enlarged, swollen and dark. The kidneys occasionally show hemorrhages on the surface which are large, dark and irregular. On the cut surface large, dark hemorrhages are quite constant in the papilla of the medulla. The lymph glands throughout the body are greatly swollen and succulent.

Pig pellagra is of a slow, gradual onset; there is a loss of weight, inappetence, little if any rise of temperature and dermatitis of the ears and body, accompanied by a watery diarrhea. On autopsy the stomach contains a small amount of ingesta and the mucosa is reddened, but there is no ulcer formation. The cecum and colon show no acute inflammatory process, but there is necrosis of the mucosa. Other organs, such as the spleen and kidneys, show little if any disturbance and the only lymphatics that show any change are those adjacent to the digestive tract.

#### SUMMARY

Decided progress has been made in the control of swine erysipelas on individual farms and in some communities, but we have not as yet learned to control it on a wide scale.

There are two infectious diseases of swine that have some similar characteristics: cholera, which is caused by a universal, specific virus, and erysipelas, which is caused by a microorganism that does not appear to be universal in all respects.

Very little has been presented on the acute septicemic form of erysipelas; this we consider a problem of the present. The future problems in this disease are to learn more about its epizootiology and control on a wide basis.

Pig pellagra is not a new disease of young swine, but, rather, an old malady, the



scientific cause of which has been recognized.

There are two diseases of swine in which disturbances of the digestive tract result in similar pathology. One is infectious in character and it is suggested that it be termed salmonellosis; the other is a nutritional deficiency—lack of nicotinic acid—which is termed pellagra.

It is not intended to leave the impression that the two maladies discussed herein are the only ones in the category of swine disease which will be problems in the future. The two diseases discussed were selected because of their importance to the swine industry and because of the confusion which many times exists in differentiating them from disturbances with which we have been familiar in the past.

The veterinarian must recognize the fact that nutritional deficiencies and infections may go hand in hand.

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### Regulations on New Drugs

No person may introduce or deliver for introduction into interstate commerce any new drug unless an application containing certain prescribed information by which an accurate decision may be made as to the safety of that drug has been filed with and accepted by the Federal Security administrator. By this means it is possible to prevent the sale to consumers of drugs not generally recognized among qualified experts as safe for use under the conditions recommended in the labeling. New drugs must first be subjected to appropriate experimental tests, proving they are in fact safe, before they may be shipped interstate for public use. To aid in obtaining the necessary experimental information, there is a provision in the act for the limited distribution of new drugs intended solely for investigational use by experts qualified by scientific training and experience to investigate the safety of drugs.—*Food and Drug Administration, Miscellaneous Publication, No. 1, 1941, p. 9.*

To his dog, every man is Napoleon; hence the popularity of dogs.—A. Huxley.

### The Biochemist and Pathologist

The espousal of the biochemist and pathologist may be attributed to the admirable genius of Pasteur, the chemist who stepped into the field of pathology from wine to silkworm to chicken to mammal. From what is now known about the nature of viruses, their elusive behavior and their attenuation for vaccination, it is evident that none but a chemist could have produced rabies vaccine from the spinal cords of rabbits, in the manner devised by Pasteur. The process, which has remained a veritable dogma for years, was more than mere desiccation of spinal cords containing rabies virus. It was a complex based upon a profound understanding of organic chemistry, involving (1) putrefaction, (2) enzymic autolysis and (3) chemical attenuation, all systematically controlled in flacons. There was time, thermic and chemical factors to be regulated. It is not easy to avoid bacterial contamination in removing spinal cords from rabbits nor to prevent the inevitable putrefaction without killing microbic life—the life to be preserved in making a vaccine. Controlling the proteolysis, the putrefaction, the rate of evaporation and the virulence of the then unknown infecting agent by impregnating the air of the flacon with regulated emanations from caustic potash and then measuring the effects on the virulence of the infecting agent from day to day by animal inoculations could only have been the work of a brilliant, "biochemic" mind. And there could be no greater paradox in research than the fact that in 60 years of prodigious criticism, not a flaw in the original work has yet been found.

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The sulfonamide drugs are being employed in the treatment of malaria as a substitute for quinine. Should quinine from the Dutch East Indies be cut off and the domestic stock exhausted, sulfadiazine will answer the purpose to a certain extent, according to a report from the Rockefeller Foundation of Panama.—*From Science News Letter.*

# Studies on Baby-Pig Mortality. II. Further Observations on Acute Hypoglycemia in Newly Born Pigs (So-Called Baby-Pig Disease)\*

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DURING THE PAST eight years an undiagnosed, highly fatal, sporadic disease of baby pigs has been investigated at the Illinois Agricultural Experiment Station. As far as determined, the disease is an entity distinct from other diseases of pigs. In lieu of a more suitable name the syndrome has been referred to as baby-pig disease.<sup>1</sup> Recently Graham, Sampson and Hester<sup>2</sup> reported an acute hypoglycemia in pigs naturally affected with this syndrome. The significance of the acute hypoglycemia is suggested by the favorable results following prompt dextrose therapy as well as by the negative findings over a period of years in examinations of naturally affected pigs for the presence of pathogenic agents, including bacteria, filtrable viruses, protozoa and toxins. Likewise the stomach and intestinal contents of affected pigs as well as the milk of sows with affected litters have been examined for the presence of toxins, with negative results. Furthermore, the sequels of such diseases as hog cholera, "flu," erysipelas and enteric disorders have been eliminated as etiologic factors.

In this paper it is proposed to describe the clinical features of baby-pig disease and present certain chemical data for pigs affected with natural and experimental hypoglycemia.

\*From the Department of Animal Pathology and Hygiene, University of Illinois; presented before the Section on Research at the seventy-eighth annual meeting of the AVMA, Indianapolis, Ind., August 11-15, 1941.

†Resigned.

<sup>1</sup>Mimeographed release (Rev. 1940), College of Agriculture, Extension Service, University of Illinois.

<sup>2</sup>Graham, R., Sampson, J., and Hester H. R.: I. Acute hypoglycemia in newly born pigs (so-called baby pig disease). *Proc. Soc. Exp. Biol. & Med.*, xlvii (1941), pp. 338-339.

## SPONTANEOUS HYPOGLYCEMIA

Hypoglycemia in newly born pigs, heretofore designated as baby-pig disease, is not regarded as a new disease. The mortality among newly born pigs, including stillbirths and deaths up to weaning age, seldom falls below an average of 30 per cent of the pigs farrowed each year,<sup>3</sup> and it is obvious that the factors directly responsible for this high mortality are not completely understood, even though considerable information is available on this important subject.

The extent of the loss in 25 naturally affected herds ranged from one to 22 litters, representing about 5 to 95 per cent of the pigs farrowed during a single farrowing season. In many outbreaks, however, a fairly large percentage of the sows and gilts gave birth to litters that did not develop the disorder. The mortality in clinically affected litters was seldom less than 75 per cent and frequently was as high as 100 per cent. Sows and gilts that gave birth to naturally affected litters showed only transitory disturbance incident to agalactia. Only fragmentary information is available regarding the possible occurrence of the subclinical disease and its indirect effect on the vigor and resistance of the litter to intercurrent infections. No attempt is made in this report to discuss weak or undersized pigs at birth or to include the problem of stillbirth, though cases of interest have been observed in herds where pigs suffered from hypoglycemia.

Baby-pig hypoglycemia develops in lit-

<sup>3</sup>Wilcox, R. H., Carroll, W. E., and Hornung, T. G.: Some important factors affecting costs in hog production. *Illinois Agr. Exp. Sta. Bul.* 390 (1933), p. 26.



Fig. 1. Acute spontaneous hypoglycemia in a litter of newly born pigs approximately 48 hours old. The range of the blood sugar for four of the pigs was 3.39 mg. to 39.55 mg. per 100 cc., and the average 18.65 mg. All of the pigs were either in a state of coma or on the borderline of coma when this picture was taken.

ters of both sows and gilts and may occur in both large and small litters. In one herd only the largest litters seemed to be affected. The incidence of the disorder appears to be highest in early and late spring litters, but it is not certain whether this is associated with herd management and the season or whether it is dependent upon the fact that fewer pigs are farrowed in the fall than during the early months of the year. All breeds of swine appear to be susceptible.

The state of nutrition of the sows and the gilts in the outbreaks described in this report was usually good and in some instances the owners were inclined to believe that the high condition of the sows at farrowing time might be associated in some way with the etiology. With few exceptions the sows and gilts with affected late winter or spring litters were fed rations that included yellow corn, a protein supplement consisting of tankage and soybean oil meal, and either a simple or a complex mineral mixture. Many of the herd owners fed a concentrate containing ground alfalfa, while one serious outbreak was observed in sows following cattle fed corn and alfalfa. In addition the sows were fed a complex mineral. Oats, and in some cases wheat by-products, often formed a basic part of the ration. Sow and gilts farrowing fall litters which developed the disease usually had access to legume or blue grass pasture. This was supplemented by a concentrate composed of the cereal grains and often a protein supplement, and in some instances an additional source of minerals fed free choice. The syndrome does not, therefore, appear to be the result of a nutritional deficiency of qualitative origin, but may bear

an indirect relationship to the quantity of feed consumed by the sow or gilt during the last few weeks before farrowing. This and many other phases of the problem merit further study.

In the typical syndrome apparently normal pigs varying from approximately 24 hours to 72 hours old or slightly older show symptoms of shivering, dullness and anorexia. The animals have a tendency to isolate themselves and burrow under the bedding. When disturbed they frequently emit a weak, crying squeal. There is no rise in temperature and in the terminal stage it is likely to fall below normal. Coincident with the loss of appetite and onset of weakness, the hair coat becomes rough, the skin cold and clammy, and the heart action slow and feeble. Finally the pig lapses into coma. Death of several or all pigs in the litter often occurs within 24 to 36 hours after the first symptoms are manifested (fig. 1).

No characteristic gross pathologic changes have been observed at autopsy. The liver in some pigs is yellow, but more often the organ is congested and of a dark red color. The frequent observation of a large mass of curdled milk in the stomach of affected pigs has been accepted as presumptive evidence of gastrointestinal stasis. On the other hand, the absence of milk in the stomach of some pigs also has been noted and seemed to suggest that these pigs had not nursed or nursed only to a limited extent between the time of birth and the onset of symptoms.

#### RESULTS OF CHEMICAL EXAMINATIONS

Chemical examinations have included a routine qualitative analysis of the urine for



the presence of albumin, sugar, bile salts, hemoglobin and ketone bodies, and quantitative determinations for calcium, inorganic phosphorus, ketone bodies and sugar content of the blood of normal and affected litters of pigs. The blood and urine of a small number of sows with normal and affected litters also have been analyzed. Chemical examination of the blood and urine of pigs has been supplemented to a



Fig. 2. Acute experimental hypoglycemia in a litter of newly born pigs approximately 72 hours old. Fatal hypoglycemia was induced by separating five of the pigs from the sow four or five hours after birth and subjecting them to a complete fast. Four litter mates were left with the sow as controls. The control pigs remained normal, whereas all five of the fasting pigs developed typical symptoms associated with acute spontaneous hypoglycemia. Four of the experimental pigs in this picture are in coma, while the fifth, at the extreme right, is still quite active. The average for the blood sugar of three of the experimental pigs was 36.18 mg. per 100 cc.; for three control pigs, 152.15 mg. per 100 cc.

limited extent by quantitative determinations for liver glycogen. Significant changes have not been found in the constituents of the blood and urine of sows with healthy and affected litters or in the constituents of the blood and urine of normal and affected litters, with the exception of blood sugar in the latter group. It should be mentioned, however, that additional data are needed before definite conclusions can be reached with respect to the other blood constituents. In this discussion, data will be submitted only for blood sugar and liver glycogen of normal and affected pigs. The differences between the two groups are so striking that there can be no reasonable doubt as to their significance.

The blood sugar\* for 39 normal pigs

\*The blood sugar was determined by the Shaffer-Hartmann-Somogyi method according to the technic of Koch. (Koch, F. C.: Practical Methods in Biochemistry, Williams and Wilkins, Baltimore, 1934).

from five litters farrowed by sows fed approximately  $1\frac{3}{4}$  lb. of concentrates per cwt. daily during pregnancy was 75.58 mg. to 149.16 mg. per 100 cc., with an average of 114.51 mg. Three pigs, or about 8 per cent, had values less than 100 mg., while 32 pigs, or nearly 83 per cent, had between 100 mg. and 140 mg. of sugar for 100 cc. of blood. These litters were approximately 12 to 48 hours old when blood was collected for analysis. The data for the blood sugar of normal pigs are summarized in table I.

The glycogen\* content of the liver of four representative pigs from two of these normal litters, one a litter of 6 and the other a litter of 13 pigs, was found to be 2.01 to 3.02 per cent, with an average of 2.62 (table I).

The range of blood sugar for 23 pigs from 10 litters affected with so-called baby-pig disease, representing 8 distinct outbreaks, was found to be from 3.29 mg. to 61.02 mg. per 100 cc., with an average of 24.83 mg. One pig had a blood-sugar concentration of 61 mg.; 6 had values between 31 mg. and 43 mg.; 12, values between 10 mg. and 30 mg.; and 4, values lower than



Fig. 3. Refractoriness of pigs approximately 130 hours old to acute experimental hypoglycemia when subjected to a fast of 168 hours. The pre-fasting average of the blood sugar for these five pigs was 127.4 mg. per 100 cc. and the post-fasting average, 79.55 mg. None developed symptoms associated with acute hypoglycemia, although all five became gaunt and tucked up in the flanks. There was a total weight loss of 3 lb. during the trial, but all of the pigs made rapid gains when taken off the fast and fed glucose solution and milk.

\*The technic of Blatherwick, Bradshaw-Ewing-Larson, and Sawyer was followed for the analysis of liver glycogen. J. Biol. Chem., cxi (1935), pp. 537-547.

TABLE I—Blood Sugar and Hepatic Glycogen in Newly Born Pigs

NEWLY BORN PIGS		BLOOD SUGAR			HEPATIC GLYCOGEN		
GROUP	DESCRIPTION	NO. PIGS	RANGE (MG./100 CC.)	AVERAGE (MG./100 CC.)	NO. PIGS	RANGE (%)	AVERAGE (%)
A	Normal pigs, 12 to 48 hours old	39	75.58-149.16	114.51	4	2.01-3.02	2.62
B	Acute clinical hypoglycemia in pigs 24 to 96 hours old	23	3.29-61.02	24.83	3	0.00-trace	
C	Acute experimental fasting hypoglycemia in pigs 36 to 96 hours old	13*	9.04-42.94	30.43	5*	0.00-trace	
D	Refractoriness of 5- to 6-day-old pigs to experimental fasting hypoglycemia	7†	79.10-158.20	122.36			
			72.32-98.31	84.75			

\*Representative pigs from five litters.

†Representative pigs from three litters.

‡At end of six- to seven-day fast.

10 mg. per 100 cc. A summary of these data is shown in table I.

Analyses on the livers of three pigs from three litters showing advanced symptoms of clinical hypoglycemia revealed values from 0.0 to a trace for hepatic glycogen. (See table I.)

Experimental acute hypoglycemia, apparently indistinguishable from the natural syndrome, has been induced in five litters of newly born pigs by the following procedure. All pigs in the litter were permitted to nurse the sow from four to six hours, and as long as ten to twelve hours in one instance, after birth. Heart blood was then collected from each pig in the litter for sugar determination. One or more pigs were sacrificed and the liver was removed and analyzed for glycogen. The remaining pigs of the litter were divided into two groups: One half of the number was returned to the sow and the other half fasted. Typical symptoms of hypoglycemia, in varying degrees of intensity but eventually terminating in coma, were manifested by all of the fasting pigs usually within 48 to 72 hours. The litter mates, which were allowed to nurse the sow, remained healthy (fig. 2).

The course of the syndrome as well as the results of the chemical analyses of the blood and livers of the fasted pigs for sugar and glycogen, respectively, were com-

parable with the range encountered in naturally affected pigs. Furthermore, the response of the fasting pigs to repeated injections of glucose solution and forced feeding of milk was also similar to the response previously noted in naturally affected pigs. Pigs showing clinical symptoms of hypoglycemia and pigs in which an experimental hypoglycemia had been produced, manifested definite improvement following prompt treatment. In some cases, treated pigs made a complete recovery. However, if the blood-sugar concentration was permitted to fall to 40 mg. per 100 cc. or lower, which appears to be the borderline of coma, treatment was usually ineffective. A transitory stimulation, either for the clinical or the experimental form of hypoglycemia, may be observed in the advanced stage of the disease following carbohydrate therapy.

A marked susceptibility of the newly born pig has been observed to the development of an acute fasting hypoglycemia during the first twelve hours of life, and a striking refractoriness of litter mates at 120 to 140 hours old to the development of acute hypoglycemia when subjected to a fasting trial. In illustration, seven newly born pigs from three litters were allowed to nurse until they were from approximately 120 to 140 hours old. They were then placed on a complete fast for six to seven days. At the end of these trials the range and the

average for the blood-sugar concentration was found to be lower than at the beginning of the fasting period, but well above the danger level. The pre-fasting average for the blood sugar was 122.36 mg. per 100 cc., and the post-fasting average, 84.75 mg. per 100 cc. of blood (table I). Furthermore, although there was a very obvious decrease in the weight of all pigs, they did not develop symptoms characteristic of acute hypoglycemia, such as drowsiness and coma, but remained active and fairly vigorous throughout the 140 to 170 hours of uninterrupted fasting\* (fig. 3). Pigs which were well nourished at the beginning of the fast responded readily to treatment with glucose solution and milk and manifested a normal appetite at the termination of the fasting experiment.

#### SUMMARY

The results of chemical examinations of the blood of baby pigs suffering from so-called baby-pig disease consistently revealed the presence of a low blood-sugar level. The relative intensity of this metabolic disturbance is indicative of an acute hypoglycemia. A possible prenatal influence on this pathologic condition in newly born pigs is obviously suggested, but until the underlying cause or causes are established, the cryptogenetic nature of the acute hypoglycemia is recognized. Contributory evidence in support of the possible primary significance of acute hypoglycemia has been observed in the therapeutic response in naturally affected pigs following repeated injections of glucose solution. Pigs in the early stage of the disease show improvement following dextrose therapy, while repeated injections of dextrose together with forced feeding of milk have demonstrated that the life of naturally affected pigs may be prolonged and that in some cases the treated pigs may recover. However, dextrose therapy, even if repeated, appears ineffective in the terminal stage of the disease.

Added support of the primary rôle of hy-

\*It is not inferred from this observation that an intense hypoglycemia might not develop in pigs 5 to 6 days old or older if subjected to a more prolonged fast.

poglycemia in baby-pig disease is found in the observation that newly born pigs are apparently highly susceptible to the development of an intense fasting hypoglycemia during the first 12 and perhaps 24 hours or longer after birth, and relatively refractory to fasting hypoglycemia at the age of from 120 to 140 hours. It has been demonstrated that newly born, well-nourished pigs, 5 to 6 days old, are relatively refractory to the development of severe hypoglycemia when subjected to a fast of one week, during which time all of the stored liver glycogen would undoubtedly be exhausted. This observation suggests that the newborn pig requires a period of several days for the regulatory mechanism involved in the production of liver glycogen from non-carbohydrate material, such as tissue protein, to function effectively. If this mechanism is not ready, and the two common sources of blood sugar—(1) absorption from the intestine and (2) reserve glycogen stored in the liver—fail, irrespective of cause, to maintain a safe sugar level, a fatal hypoglycemia becomes imminent.

#### Figures Tell Significance of Smallpox Vaccination

In 1939, there were but four cases of smallpox in Italy. In 1940, none was reported. In the United States during the 43 weeks ending October 25, 1941, there were 2,089 cases recorded by the federal public health service.

For typhoid fever, wherein sanitation rather than vaccination is the controlling factor, figures are reversed. Italy had 26,106 cases in one year (1940) while in the entire United States there were but 12,303 cases for the median 1936-1940.

"The filthiest stream I know," said to be the Naugatuck in southwestern Connecticut, is used by scientists of Yale to study flies as carriers of infantile paralysis virus. On two occasions they isolated the virus in flies captured in that region.



# The Present Status of Avian Encephalomyelitis\*

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ACCORDING TO THE recollections of poultry students in the New England region, an apparently new disease of chicks characterized by trembling and ataxia was observed in Kingston, Mass., in the spring of 1930. The malady was first described by Jones<sup>1, 2</sup> under the name of "epidemic tremor" and tentatively classified as a neurotropic virus disease. Further observations indicated that only a comparatively small number of cases showed the characteristic symptoms of trembling implied in the name. The term also failed to convey a pathologic or etiologic conception of the disease. For these reasons, Van Roekel *et al.*<sup>3</sup> suggested the term "infectious avian encephalomyelitis," which was adopted in the binomial form, "avian encephalomyelitis" (A. E.), by the Committee on Poultry Diseases of the American Veterinary Medical Association.<sup>4</sup> Tyzzer and Sellards,<sup>5</sup> however, take exception to this change in name on the grounds that the older term has priority and is more descriptive.

## **PATHOLOGY**

In consideration of the morphologic expressions of the disease, detailed descriptions are not necessary, since they are

available in the literature.<sup>2, 6</sup> It is the purpose here to point out new observations and controversial aspects.

As stated by Jones,<sup>2</sup> the most striking symptom of the disease is a rapid vibration of the head and neck, which is intensified, or even brought on, by excitement. In very young chicks retraction of the head and a tendency toward retropulsion have been observed occasionally. Body tremor may be noticed on handling affected chicks. Another important clinical sign is a bilateral progressive ataxia accompanied by weakness in the tarsometatarsal joints. On account of this symptom, A. E. must be considered in the differential diagnosis<sup>7</sup> of paretic conditions of chicks, and specifically diagnosed on the basis of histologic changes. The disease exhibits, therefore, two markedly different clinical manifestations, which may be characterized as the "clonic" and the "atactic" or "paretic" forms. In a recent series of 223 histologically verified cases of A. E., 20.2 per cent showed tremor alone, 40.8 per cent paresis alone, and 39 per cent both symptoms. Both clinical forms may occur either alone or in combination in individual chicks and in flock outbreaks. It is important to recognize the occurrence of the uncomplicated paretic form in flock outbreaks, because such cases are likely to be incorrectly diagnosed.

The specific anatomo-pathologic changes are microscopic in character. Affected chicks usually exhibit a good state of nourishment, unless they have been prevented from feeding by prolonged ataxia. White breeds often show an intense yellow discoloration of the subcutis and the breast muscle, probably of a nonspecific character.

The lesions in the central nervous sys-

\*From the Department of Animal Diseases, University of Connecticut; presented before the Section on Poultry at the seventy-eighth annual meeting of the AVMA, Indianapolis, Ind., August 11-15, 1941.

This study was supported in part by a grant from the New England Epidemic Tremor Research Association, Inc.

<sup>1</sup>Jones, E. E.: An encephalomyelitis in the chicken. *Sci.*, lxxvi (1932), pp. 331-332.

<sup>2</sup>*Ibid.*: Epidemic tremor, an encephalomyelitis affecting young chickens. *J. Exp. Med.*, lxx (1934), pp. 781-798.

<sup>3</sup>Van Roekel, H., Bullis, K. L., and Clarke, M. K.: Preliminary report on infectious avian encephalomyelitis. *J.A.V.M.A.*, xciii (1938), pp. 372-375.

<sup>4</sup>Special Committee on Poultry Diseases, American Veterinary Medical Association: *J.A.V.M.A.*, xcv (1939), pp. 613-623.

<sup>5</sup>Tyzzer, E. E., and Sellards, A. W.: The pathology of equine encephalomyelitis in young chickens. *Am. J. Hyg.*, xxxiii (1941), pp. 69-81.

<sup>6</sup>Olitsky, P. K.: Experimental studies on the virus of infectious avian encephalomyelitis. *J. Exp. Med.*, lxx (1939), pp. 565-582.

<sup>7</sup>Jungheer, E.: Differentiation of paralysis in chicks. *Poultry Sci.*, xv (1936), pp. 415-416.

tem (C.N.S.) exhibit collections of neuroglial cells, polyblastic (largely lymphocytic) perivascular infiltrations, and neuronal degenerations.

Microscopic collections of neuroglial cells in the brain and spinal cord were considered by Jones<sup>2</sup> to constitute the distinctive lesions of A. E. The cell masses were composed of ectodermal and occasionally of mesodermal elements, and were centered around the capillaries throughout the C.N.S. In a restudy\* by Jungherr<sup>8</sup> of these commonly occurring focal collections, in Cajal's gold chloride and Hortega's silver carbonate preparations, most of the infiltrating cells failed to exhibit neuroglial processes. The smallest recognizable lesions seemed to be composed of hyperplastic endothelial and adventitial cells, together with considerable neural or perivascular infiltration by lymphocytes, while astro- and microglial reactions were confined primarily to the periphery of the inflammatory zones. In his detailed description of the pathology, Olitsky<sup>6</sup> mentioned the occasional occurrence of small accumulations of glial cells, especially in chronic A. E. A recent paper on the pathologic differentiation of equine and avian encephalomyelitis in chicks by Tyzzer and Sellards<sup>5</sup> reiterated the diagnostic importance of collections of various types of neuroglial cells in A. E. which were considered to occur regularly. If their claims were substantiated, there would be on hand a practical method of differentiating A. E. from central neurolymphomatosis, based on the cell type involved, a postulate which is not supported by practical experience.

Lymphocytic infiltrations, especially around the larger vessels, were noted in the original description<sup>2</sup> of the disease. In our observations even small, recognizable lesions showed mononuclear (primarily lymphocytic) infiltration of the walls and the Virchow-Robin spaces of the capillaries, without any special tendency for the

lesions to remain confined to the latter. Olitsky<sup>6</sup> observed that the perivascular reaction of lymphocytic, and occasionally large monocytic, cells sometimes attained extraordinary development throughout the brain, while the cord was relatively free from it and vascular damage was ordinarily absent.

Neuronal degenerations were first emphasized by Olitsky<sup>6</sup> as the most common and striking lesion of the C.N.S. in A.E., although Jones<sup>2</sup> spoke of the occurrence of severe degeneration of Purkinje's cells, an observation not confirmed by Olitsky. According to Olitsky, neuronal degeneration occurs in the entire C.N.S., but especially in the brain stem, medulla and the anterior horn cells in the region of the lumbo-sacral sinus. The progressive changes consist of swelling of both the cell body and nucleus, nuclear eccentricity, tigrolysis and eosinophilia; only in chronic cases does one find some indications of neuronophagia and satellitosis.

The intensity of the focal lesions in the C.N.S. varied widely and was quite independent of the severity of the symptoms. Estimated by an arbitrary system of grading from  $\pm$  to 4+, the lesions of 283 spontaneous cases of A. E. appeared to fall into the following classes:  $\pm$  in 8.8, + in 38.5, 2+ in 38.5, 3+ in 0.9, and 4+ in 3.1 per cent of the cases. These data suggested the comparative mildness of lesions in spontaneous A.E. and, conversely, the diagnostic significance of minor focal alterations.

The distribution of the focal lesions in the C.N.S. exhibited a distinct vascular orientation; occasionally the larger vessels of the central cerebellar white matter showed cuffing; otherwise, the focal lesions were observed in the gray matter of the brain, while the cord did not show this restriction. About one fifth of the spontaneous cases showed lesions in only one of the major subdivisions of the brain, the remainder in two or more subdivisions. The cerebrum was affected in about 31 per cent, the midbrain, cerebellum and medulla in 22 to 23 per cent of the cases.

The peripheral nervous system does not manifest specific lesions; this fact distin-

\*Dr. Abner Wolf, Department of Neuropathology, Columbia University, kindly coöperated in this work.

<sup>8</sup>Jungherr, E.: Pathology of spontaneous and experimental cases of epidemic tremor, Poultry Sci., xviii (1939), p. 406.

guishes A. E. from peripheral neurolymphomatosis. Myelin degeneration in the sciatic nerves was occasionally observed by Jungherr.<sup>8</sup> Olitsky<sup>6</sup> did not note demyelination, but in certain instances he detected neuronal degeneration in spinal ganglia.

The visceral lesions consist of hyperplasia of the lymphoid follicles which normally occur quite irregularly distributed throughout the avian tissues. The hyperplastic follicles are of two types; they either have an irregular outline without a definite boundary, or they are oval or circular in shape and are surrounded by a delicate, capillarized, connective tissue membrane. The latter type is the more characteristic. In the order of decreasing diagnostic importance, the affected tissues are the ventriculus, proventriculus, pancreas, heart, striated muscle, spleen, liver, kidneys, adrenals, gonads and intestine. In the myocardium only definite lymphoid follicles are of importance, since this organ normally shows loose extramedullary myelopoietic foci in a high percentage of the cases.<sup>9</sup> The ventricular and proventricular muscle is ordinarily devoid of lymphoid follicles; their occurrence is, therefore, of diagnostic significance. The pancreas normally may contain two or three irregular follicles in a section about one-half inch in length, but the occurrence of numerous sharply circumscribed follicles in A. E. is a striking feature.

On the whole, the irregular occurrence of aggregate lymphoid tissue in the avian body makes it difficult to draw a sharp line between physiologic and pathologic states. Visceral lesions alone are not considered diagnostic unless accompanied by specific lesions in the C.N.S.

In trying to correlate the pathologic evidence with the symptoms in known cases of A. E., it was found that about 11 per cent revealed symptoms, but failed to show typical focal lesions; on the other hand, about 8 per cent of symptomless cases exhibited typical lesions which would indicate the occurrence of a "latent" form.

<sup>9</sup>Pappenheimer, A. M., Dunn, L. C., and Cone, V.: Studies on fowl paralysis (neurolymphomatosis gallinarum). I. Clinical features and pathology. *J. Exp. Med.*, xlix (1929), pp. 63-86.

The pathology of experimental cases differed only slightly from that of spontaneous. The perivascular reactions in the central nervous system frequently showed massive development, especially in the cerebrum, as would be expected from the mode of inoculation. A spread of the causal agent throughout the brain tissue was indicated by the demonstration of lesions in the other major subdivisions of the brain. The visceral lesions of experimental cases were much less pronounced than those of the spontaneous; in many instances they were absent.

#### OCCURRENCE

There are no comparable statistical data available as to the occurrence of A. E. in the various states. In 1939, Van Roekel<sup>10</sup> stated that A. E. appeared to be on the increase in Massachusetts. The diagnostic data of the Connecticut laboratory for the fiscal years 1935 to 1941 recorded an incidence of 2, 17, 23, 61, 27, 44 and 53 cases for the respective years.

A. E. has been observed in the New England States, New York,<sup>11</sup> New Jersey, Delaware,<sup>12</sup> Virginia, Indiana,<sup>13</sup> Colorado,<sup>14</sup> Georgia,<sup>15</sup> Tennessee<sup>16</sup> and Florida<sup>16</sup>; it has also been reported from Australia by Hart,<sup>17</sup> according to Asplin.<sup>18</sup>

The course of the disease varies in different flocks. In a survey of 45 outbreaks the first symptoms were observed between the ages of 2 and 25 days, with an average of 16 days; the morbidity varied from 0.1 to 50

<sup>10</sup>Van Roekel, H.: Avian encephalomyelitis investigation. *Ann. Rpt., Dept. Vet. Sci., Massachusetts Agr. Exp. Sta. Bul. 355* (1939), p. 96.

<sup>11</sup>Huttar, J. C.: Personal communication (Ithaca, N. Y., 1941).

<sup>12</sup>Baker, H. R.: Personal communication (Dover, Del., 1941).

<sup>13</sup>Doyle, L. P.: Encephalomyelitis in chicks. *Purdue Univ. Agr. Exp. Sta. Ann. Rpt.* (1939), p. 107.

<sup>14</sup>Stiles, G. W.: Personal communication (Denver, Colo., 1939).

<sup>15</sup>Kelley, J. W.: Personal communication (Auburn, Ga., 1941).

<sup>16</sup>Smith, B.: Personal communication (Nashville, Tenn., 1941).

<sup>17</sup>Hart, V.: *Australian Vet. J.*, xvi (1940), p. 95. Cited by F. D. Asplin.

<sup>18</sup>Asplin, F. D.: Riboflavin deficiency in poultry. *Vet. J.*, xcvi (1941), pp. 16-26.



per cent with an average of 16.7 per cent; the mortality from 0 to 66 per cent, with an average of 9.7 per cent.

In similar figures based on a one-year hatchery output of 9,284,990 chicks,\* the mortality ranged from 3 to 67 per cent, with a weighted average of 9.7 per cent. The chicks shipped in 9,139 orders showed an incidence of 72 cases, or 0.8 per cent. If, however, the different sources of the chicks were segregated into suspicious† and non-suspicious, the incidence in 2,826 chick orders derived from suspicious sources was 2.5 per cent. In instances where the first symptoms made their appearance during the second week of brooding, mortality was especially high. The principal loss came from the general practice of culling affected chicks. While some of the trembling chicks show temporary recovery, they may come down at the age of 6 to 8 weeks with a unilateral paresis indistinguishable from that seen in ordinary neurolymphomatosis.

All standard breeds of chicks seem to be susceptible. Our own limited data showed straight breeds to be affected in about 43 per cent and cross-breeds in 57 per cent of the cases. The hatchery data indicated involvement of BR crosses in 26.3, sex-linked pullets (RIR male by BR female) in 28.7, sex-linked cockerels in 30.3, light-weight crosses in 1.6, heavy-weight crosses in 0.2, RIR in 8.8, and BR in 4 per cent of the cases. Although SCWL did not appear in these data, other observations indicate susceptibility of the breed.

Hatchability of eggs, which ordinarily is a sensitive indicator of the general health of a flock, does not seem to be influenced by A. E. In a study of 17 A. E. outbreaks in twelve flocks in which the source of eggs could be traced, the hatchability records were high at the time of the outbreaks, and did not vary markedly from 6-month averages of these flocks.

There were several instances of reoccur-

rence of A. E. in subsequent hatches. One of the twelve flocks under observation gave evidence of the disease in three successive weekly hatches, and again in three later hatches at intervals of one to two weeks. The other eleven flocks revealed only one such case each, during the first semester of a calendar year. The distance of shipping hatching eggs likewise seemed to have little influence. Of 47 parent flocks found in Connecticut to be "suspicious," 10 were located in Maine, 2 in New Hampshire, 5 in Vermont, 1 in Rhode Island, 12 in Massachusetts, and 17 in Connecticut.

A seasonal prevalence of the disease was suggested by the hatchery data of the last four years. The first minor epiornithic period occurred in November and December, and the second major one between January and June, with a peak in February to March. Only during the summer of 1939 were a few sporadic cases observed. During the inter-epiornithic periods the average hatchery output was not materially changed, and the sources of hatching eggs, including the so-called suspicious sources, remained practically the same.

#### ETIOLOGY

Avian encephalomyelitis is an acute infectious disease caused by a filtrable virus. Jones<sup>2</sup> was unable to demonstrate cultivable organisms in the tissues of affected birds, and failed to show any relationship of the disease to nutritional deficiencies. The infective agent was shown by her to pass through Seitz and Berkefeld N filters, and to survive in 50 per cent glycerin for 69 days. The filtrability of the disease-producing agent through filters (Seitz and celloidin) was confirmed by Van Roekel *et al.*<sup>3</sup> Olitsky<sup>6</sup> found the virus capable of passing through Berkefeld V and N candles and Seitz 1 and 2 disc filters and, in collaboration with Bauer,<sup>10</sup> to have a diameter of 20 to 30 millimicrons as determined by gradocol membrane filtration. He also showed the absence of immunologic relationship

\*These figures were collected by a large hatchery and kindly placed at our disposal.

†In standard hatchery practice it is almost impossible to fill orders from a single egg source. Therefore, in the compilation of these data, egg sources which gave rise to A. E.-infected chicks more than once were considered as suspicious sources.

<sup>10</sup>Olitsky, P. K., and Bauer, J. A.: Ultrafiltration of the virus of infectious avian encephalomyelitis. *Proc. Soc. Exp. Biol. & Med.*, xlii (1939), pp. 634-636.

between A. E. and eastern and western equine encephalomyelitis.

The question of the sedimentability of A. E. virus is not settled. In Olitsky's<sup>6</sup> experiments the supernatant fluid was still infective after angle centrifugation at 5,400 and 12,000 rpm for one hour. In a single experiment in this laboratory one-hour centrifugation at 20,000 rpm (International Centrifuge high-speed attachment) yielded a sediment which produced three out of five takes in a dilution of  $10^{-3}$ , while the supernatant fluid was nonvirulent.

Tissue cultures of the virus were accomplished by Kligler and Olitsky<sup>20</sup> in whole embryo-Tyrode's suspension plus chicken serum, but these authors found the method unfavorable for obtaining large yields of potent virus.

The range of experimental hosts is limited. Van Roekel *et al.*<sup>21</sup> found turkey poult and ducklings susceptible; white mice, guinea pigs, rabbits, mature pheasants and sparrows were refractory. The present authors also were unable to infect white mice and rabbits. In preliminary experiments of Eichhorn<sup>22</sup> young pigeons were reported to have been susceptible.

**Serology.**—Neutralization experiments with A. E. convalescent serums were first reported by Olitsky.<sup>6</sup> Using five chicks for the various dilutions, he reported three takes with  $10^{-4}$  and  $10^{-5}$  broth-virus controls, while two takes were obtained with the  $10^{-4}$  virus-serum mixture, and none with the  $10^{-5}$ . In our own tests on six control chicks for each dilution, normal avian serum failed to neutralize decimal virus dilutions of from  $10^{-2}$  to  $10^{-4}$ . On 18 test chicks for each dilution, the  $10^{-2}$  convalescent serum-virus mixture failed to show neutralization, the  $10^{-3}$  mixture showed about 22 per cent, and the  $10^{-4}$ , 50 per cent reduction in the number of takes. Thus, neutralizing antibodies for comparatively high virus dilutions ( $10^{-4}$  to  $10^{-5}$ )

have been demonstrated in the serums of both natural and experimental convalescent chicks 50 to 60 days old.

Complement-fixation tests were attempted, the test materials being alcoholic extracts of brains from normal and A. E.-affected chicks and serums from experimental convalescent chicks, according to the method of Weil and Liebert.<sup>23</sup> The results were negative. Water-extracted brain antigens, as used by Casals and Palacios,<sup>24</sup> and chick hyperimmune serums likewise gave negative results. Rabbit immune serums gave complement-fixation reactions with alcoholic extracts of both normal and A. E.-affected chick brains; it was impossible to remove the basic brain antibodies by absorption.

In preliminary agglutination tests by the adsorption of virus on heat-killed suspensions of nonspecific bacteria (*Serratia marcescens*), according to the method of Roberts and Jones,<sup>25</sup> adult chicken hyperimmune serum agglutinated the virus-bacteria suspension specifically in a dilution of 1:16. Normal chick-brain immune serums prepared in the adult chicken failed to give a similar reaction. Thus far, serums from spontaneously and experimentally affected chicks have not reacted.

**Virulence.**—In transmission experiments with brain and cord suspensions from two outbreaks Jones<sup>2</sup> obtained three clinical and two additional histologic takes in 91 chicks inoculated. In early passage experiments the average was 25 per cent takes, with an incubation period of from 21 to 28 days; in later passages the percentage of takes varied up to 100. In a series of 42 passage experiments with a composite field strain Van Roekel *et al.*<sup>3</sup> were able to increase the original number of takes from 59 to 88 per cent, and to decrease the average incubation period from 25 to 13 days. This strain,

<sup>20</sup>Kligler, I. J., and Olitsky, P. K.: Experiments on cultivation of virus of infectious avian encephalomyelitis. *Proc. Soc. Exp. Biol. & Med.*, xliii (1940), pp. 680-683.

<sup>21</sup>Van Roekel, H., Bullis, K. L., and Clarke, M. K.: Infectious avian encephalomyelitis. *Vet. Med.*, xxxiv (1939), pp. 754-755.

<sup>22</sup>Eichhorn, A.: Personal communication (Beltsville, Md., 1941).

<sup>23</sup>Weil, A., and Liebert, E.: Tumors of the Nervous System (Williams and Wilkins Co., Baltimore, 1937), pp. 56-67.

<sup>24</sup>Casals, J., and Palacios, R.: Complement-fixation in encephalitis and rabies virus infections. *Sci.*, xciii (1941), pp. 162-163.

<sup>25</sup>Roberts, E. C., and Jones, L. R.: Agglutination of encephalitis virus-coated-bacterial cells by virus antisera. *Proc. Soc. Exp. Biol. & Med.*, xlvii (1941), pp. 75-76.

which formed the basis of Olitsky's studies,<sup>6</sup> was shown by Olitsky to have an infective titer of between  $10^{-5}$  and  $10^{-6}$ . In our hands the same strain, which was kindly placed at our disposal by Dr. Van Roekel, had an average titer of  $10^{-4}$ , and occasionally one of  $10^{-5}$ . In the present authors' transmission studies on 19 different field cases, eleven takes were registered in the first passage, but only five of them could be subpassaged regularly. The number of takes in the first passage varied from 33 to 100, with an average of 41 per cent, the incubation period from 18 to 70 days, with an average of 28, and the titer of the strains from  $10^{-2}$  to  $10^{-3}$ . These data indicate that the virus concentrations in original material are either low or subinfective, a fact which must be taken into consideration in using isolation of the virus as part of the diagnostic procedure.

Attempts were made to increase the virulence of strains whose infective titers were known. Following the suggestion of Sabin and Duffy<sup>26</sup> that vitamin deficiencies may lower the constitutional resistance, especially the blood-brain barrier, in neurotropic virus diseases, A. E.-inoculated chicks were placed on various diets containing known suboptimal supplies of vitamin A (50 I. U. per chick per day), E (0.05 mg. alpha-tocopherol), B<sub>1</sub> (25  $\gamma$ ), and riboflavin (25  $\gamma$ ), without increasing the number of takes as over those obtained with chicks receiving commercial (control) diets.

Intraperitoneal injection of 50 per cent glycerol-saline solutions in 23 chicks in doses of 0.3 cc. (0.5 cc. proved toxic), as suggested by King,<sup>27</sup> increased the number of takes 10 per cent over the 68 per cent of the controls. Protamin zinc insulin injected subcutaneously in doses of 4 I. U. per kilogram (2.2 lb.) one hour before virus injection, according to Sandler,<sup>28</sup> failed to in-

crease the number of takes, although a marked hypoglycemia was produced. An equal part of an admixture of 5 per cent soluble starch with the brain-virus suspensions, as originally tried by Jones<sup>2</sup> and also suggested by King,<sup>27</sup> increased the number of takes in 33 chicks about 8 per cent. Higgin's India ink in a 1:20 suspension failed to show any virulence-enhancing property. Ten per cent fresh testicular extract of rabbits, prepared according to Duran-Reynals,<sup>29</sup> doubled the number of clinical takes in a limited number of chicks. Jones<sup>2</sup> had failed to show any effect of rabbit testicular extract.

*Route of Infection.*—Jones<sup>2</sup> reported failure to transmit the causal agent by the intraperitoneal and oral routes, and no increase of takes by combining intracerebral with parenteral inoculations. In addition to the routine intracranial route, positive transmissions have been reported by intranasal inoculation and by contact (Van Roekel *et al.*<sup>21</sup>). Olitsky<sup>6</sup> reported a small number of takes after a prolonged incubation period, following intraperitoneal, subcutaneous, intradermal, intravenous, intramuscular and intrasciatic injections, but failed to obtain results by the intranasal, intraocular and oral routes. In the present authors' experiments only intravenous inoculation produced takes, although eight different noncerebral routes of transmission were tried. All of the inoculated chicks were found to be susceptible by intracerebral reinoculation, except the chicks inoculated into the peritoneal cavity. The immunologic significance of the last-mentioned observation requires further scrutinizing.

Field observations suggest the possibility of very limited transmission of the disease by natural contact. For example, outbreaks were observed on the same premises in two flocks of chicks of the same age, but of different breeds and from different sources. In one of the breeds the incidence was about 60 per cent, obviously constituting the main source of the disease, while the incidence in

<sup>26</sup>Sabin, A. B., and Duffy, C. E.: Nutrition as a factor in the development of constitutional barriers to the involvement of the nervous system by certain viruses. *Sci.*, xci (1940), pp. 552-554.

<sup>27</sup>King, L. S.: Studies on eastern equine encephalomyelitis. IV. Infection in the mouse with fresh and fixed virus. *J. Exp. Med.*, lxxi (1940), pp. 95-106.

<sup>28</sup>Sandler, B. P.: The production of neuronal injury and necrosis with the virus of poliomyelitis in rabbits during insulin hypoglycemia. *Am. J. Path.*, xvii (1941), pp. 69-80.

<sup>29</sup>Duran-Reynals, F.: The effect of testicle extract and of normal serum on a transplantable epithelial tumor of the rabbit. *J. Exp. Med.*, lrv (1931), pp. 493-497.



the other breed was about 1 per cent, presumably brought on by contact.

**Cycle of Infection.**—Two years after the discovery of A. E. by Jones in 1930, Bottorff<sup>30</sup> and Bottorff *et al.*<sup>31, 32</sup> observed it in New Hampshire, Maine and Vermont. In their studies management factors, such as types of brooding, temperature, feed and growth, failed to show any causal relation to A. E. In pedigree hatches, with the employment of reciprocal crosses of affected birds, no cases were observed. Van Roekel<sup>33</sup> and Van Roekel *et al.*<sup>21</sup> inoculated 700 fresh-hatching eggs with saline suspensions of A. E. brain virus, and found 56 of 108 chicks which hatched to exhibit specific symptoms. They also inoculated 10- to 12-day-old embryos and observed symptoms in some of the chicks soon after hatching. On the basis of these data and on field observations, they postulated an egg-borne cycle of the disease. Kligler and Olitsky<sup>20</sup> inoculated 5- to 7- and 11- to 13-day-old embryos through the allantois; they found the virus to survive not more than 48 to 72 hours, and expressed the opinion that the disease-agent is probably not transmissible by way of the egg.

In the present experiment on the susceptibility of the chick embryo to A. E., 40 viable chicks hatched out of 337 fresh-hatching eggs which had been inoculated into the yolk sac with from 0.1 to 0.3 cc. of saline suspension of brain virus. Three of the chicks showed specific clinical symptoms at the age of two days. Of 60 five-day-old embryos inoculated into the yolk sac, nine developed chicks, one of which revealed typical histologic lesions. Similarly, of 22 fourteen-day-old embryos, twelve developed, with one histologic take. Of 634 seven-

to fifteen-day-old embryos inoculated intracerebrally by the method of Dawson,<sup>34</sup> 238 chicks hatched, of which 68 showed clinical symptoms within four weeks, and typical histologic lesions. A number of clinically negative cases also had lesions; the examination of the entire series has not been completed. The egg-inoculated virus could be passaged to chicks, but only rarely back to embryos. Of 161 seventeen-day-old embryos inoculated intravenously by the method of Eichhorn,<sup>35</sup> 76 hatched, with four clinical and histologic takes. Of 70 twelve-day-old embryos inoculated into the chorioallantois, none showed specific evidence of the disease. In line with Kligler and Olitsky's studies,<sup>20</sup> the virus could not be demonstrated in the allantois after four days. Inoculation of histologically normal chick brains into embryos did not produce evidence of A. E. infection.

The presence of the virus in embryonic remnants of the developed chick was investigated by inoculating unabsorbed egg-yolk material from 2-week-old A. E. field cases into susceptible chicks. In one of the two trials conducted, a potent A. E. virus was demonstrated and identified by sub-passages. This experiment may be considered analogous to the demonstration of *Salmonella pullorum* in the unabsorbed egg yolk, which usually constitutes presumptive evidence of the egg-borne source of the disease (in distinction from pulmonary involvement, which suggests incubator infection).

Nothing is known as to the behavior of A. E. virus during interepiornithic periods. Evidence was sought for the presence of the virus in adult survivors of A. E. field outbreaks by (a) histologic examination, (b) intracerebral inoculation of tissues, and (c) injection of feces from adult birds.

Five 4- to 12-month-old chickens were subjected to detailed histologic studies. Three of these showed mild residual tre-

<sup>30</sup>Bottorff, C. A.: Epidemic tremors (trembling chick disease). Rpt. 7th Ann. Conf. Lab. Workers in Pullorum Disease Control (mimeographed, 1934).

<sup>31</sup>Bottorff, C. A., Tepper, A. E., Martin, C. L., Charles, T. B., Reed, F. D., Phillips, T. G., and Shrimer, S. R.: Epidemic tremors, (trembling chick disease). Proc. Sixth World's Poultry Cong. (1936), II, pp. 99-103.

<sup>32</sup>Bottorff, C. A., Tepper, A. E., Martin, C. L., Charles, T. B., and Reed, F. D.: Epidemic tremors (trembling chick disease). New Hampshire Agr. Exp. Sta. Circ. 51 (1936).

<sup>33</sup>Van Roekel, H.: Avian encephalomyelitis studies. Rpt. Twelfth Ann. Conf. Lab. Workers in Pullorum Disease Control (mimeographed, 1939), p. 19.

<sup>34</sup>Dawson, J. R.: Infection of chicks and chick embryos with rabies. Sci., lxxxix (1939), pp. 300-301.

<sup>35</sup>Eichhorn, E. A.: A technique for the intravenous inoculation of chick embryos. Sci., xcii (1940), pp. 345-346.

mor and ataxia, but only one had typical lesions in the C.N.S. However, one clinically normal bird exhibited brain lesions which were considered indistinguishable from those of the spontaneous chick disease.

With material from these five adult birds three chicks each were injected with saline suspensions of brain, spinal cord, ovary, oviduct (or testicle), spleen, liver, kidney, pancreas, bone marrow, and sciatic nerve. None of the treated chicks showed positive clinical symptoms during a six-week period of observation. Histologic examination of the brains of at least two of the three inoculated chicks revealed that the tissues from each of the adult birds, except the specimen which was negative on both clinical and histologic examination, produced scattered brain lesions varying in severity from  $\pm$  to 2+. The brain lesions were indistinguishable from those of spontaneous A. E. Ovary, testicle and oviduct proved particularly effective, and in some instances the liver and pancreas.

The possible presence of the virus in the feces of adult birds was studied, since the findings of Trask and coworkers<sup>36</sup> and Theiler and Gard<sup>37</sup> demonstrated elimination of poliomyelitis and of mouse encephalitis virus through the feces. Olitsky<sup>38</sup> made the significant observation that the virus could be recovered from the intestinal contents, walls and glands of normal mice, but not from the C.N.S.

Freshly collected feces from adult birds were suspended in saline solution, filtered through Seitz pads and inoculated intracerebrally into two chicks each. A total of 47 fecal specimens from two A. E.-affected flocks were used. None of the injected birds showed clinical symptoms during a six-week period of observation. Of the 47 specimens, 21, or 44.6 per cent, produced brain lesions which were similar in

character and intensity to those seen in adult-tissue-injected chicks. In a corresponding series of 30 fecal samples from presumably A. E.-free flocks, 8, or 26.6 per cent, produced such lesions.

As the experiences of Jones<sup>2</sup> and Van Roekel<sup>3</sup> suggested that Seitz filtration reduces the potency of A. E. virus considerably, means were sought to sterilize the fecal suspensions without filtration. Anesthetic ethyl ether in a concentration of 15 per cent, as used by Gard,<sup>39</sup> failed to sterilize the suspension. Duponol in a concentration of 0.75 per cent and above, in combination with ether, as employed by McClure,<sup>40</sup> brought about bacterial sterilization of the fecal suspensions, but caused a marked transient reaction in injected chicks. A. E. virus added experimentally to fecal suspensions in concentrations of about  $10^{-2}$  to  $10^{-3}$ , and then exposed to Duponol-ether for 24 hours, apparently retained its potency. There has not been an opportunity to try this method under practical conditions.

As stated before, injection of tissues and feces from adult birds has not thus far resulted in typical clinical takes, but histologic lesions were produced in a high percentage of the cases. Such lesions were of equal or greater severity than those found in some spontaneous cases of A. E. It would appear, therefore, that tissues and feces from adult A. E.-affected flocks contain a filtrable factor which is capable of producing C.N.S. lesions which are indistinguishable from spontaneous A. E. virus infection. Feces from presumably normal flocks also contained this factor, but in a smaller percentage of the cases.

#### SUMMARY

Avian encephalomyelitis, or epidemic tremor, occurs in two clinical forms, one that is "clonic" and characterized by fine vibrations of the head and neck, and an "atactic"

<sup>36</sup>Trask, J. D., Paul, J. R., and Vigne, A. J.: Poliomyelitis virus in human stools. *J. Exp. Med.*, lxxi (1940), pp. 751-763.

<sup>37</sup>Theiler, M., and Gard, S.: Encephalomyelitis of mice. III. Epidemiology. *J. Exp. Med.*, lxxii (1940), pp. 79-90.

<sup>38</sup>Olitsky, P. K.: A transmissible agent (Theiler's virus) in intestines of normal mice. *J. Exp. Med.*, lxxii (1940), pp. 113-127.

<sup>39</sup>Gard, S.: Method for detecting poliomyelitis virus in sewage and stools. *J. Exp. Med.*, lxxi (1940), pp. 779-785.

<sup>40</sup>McClure, G. Y.: An improved method for determining the presence of the virus of anterior poliomyelitis in stool specimens. *Sci.*, xciii (1941), p. 118.

or "paretic" form, which is marked by incoördination and bilateral weakness of the legs. The two conditions may occur alone or in combination. Delayed paretic cases simulate fowl paralysis.

The specific lesions are microscopic in character. The central nervous system shows three types of lesions, namely, collections of neuroglial cells, lymphocytic perivascular infiltrations and neuronal degenerations, of which the last two are the more important. The visceral lesions consist of hyperplasia of normally occurring lymphoid follicles in the visceral organs, especially in the pancreas. Because as a rule they are normally absent, such lesions in stomach muscles are almost pathognomonic. Without associated central nervous system lesions, visceral lesions are of doubtful diagnostic value.

Since its discovery in 1932, the disease has been reported from most of the Atlantic states, from Colorado, Indiana and Tennessee, and from Australia. Accumulated data on the course of the disease indicate that the average age at which symptoms first appear is 16 days, with an average morbidity of 16.7 and a mortality of 9.7 per cent. Cross breeds seem to be more frequently involved than straight standard breeds. Hatchability and shipping distance of eggs apparently do not influence the incidence of the disease. There appears to be a minor seasonal incidence from November to December, and one of major proportion from January to June.

The disease is caused by a filter-passing virus of an approximate diameter of 20 to 30 millimicrons with a limited avian host range. The serum of convalescent chicks possesses weak specific neutralizing antibodies. The neutralization test in its present form is not suitable for the detection of possible carriers.

The average field virus is of low virulence. The irregular incidence of the disease even in known-affected flocks suggests the existence of a precipitating factor the nature of which is unknown. No control measures are available. Visibly affected chicks should be culled, but condemnation

of affected parent stocks should be contemplated only after repeated outbreaks.

Chick embryos 1 to 18 days old are susceptible to artificial infection by various routes. The unabsorbed egg yolk of field cases contains the virus.

Adult survivors may show specific residual lesions. Tissues and feces of adult birds contain a filtrable factor which causes microscopic brain lesions in inoculated chicks which are indistinguishable from those of spontaneous chick cases. Feces from presumably normal flocks contain the factor in a small percentage of cases. The results suggest an egg-borne cycle of avian encephalomyelitis infection, the persistence of the virus in visceral, especially gonadal, tissues of certain adult birds, and its elimination by way of the genital and digestive tracts.

### Farming and Politics\*

A correspondent to *The Veterinary Record*, believing that the present revival of farming is but an exigency of the war, warns the British politicians that their traditional neglect of agriculture in times of peace, which has brought disaster twice in this century, has long been out of date. State control (even state ownership of the land) is proposed as a means of preventing the return of landlords who did not regard agriculture as a source of revenue.

Another writer on the same subject (same place) says: "There is little doubt that the next form of economic order will be founded upon a basis of coöperative ownership—call it socialism, nationalism or what you will—under democratic British tradition. The root of two conflicts in 25 years lies not in German Prussianism, but in the system which now brings about its own destruction."

Farmers complaining about the rise in wages for farm hands are reminded by *Pathfinder* that the rise is not as great as the price of their products.

\*Excerpts of a heated debate over state and private practice and the traditional neglect of agriculture as a basic industry in Great Britain.



# Sulfaguanidine Feeding as a Control Measure for Cecal Coccidiosis of Chickens\*

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SHORTLY AFTER THE introduction of sulfaguanidine (sulfanilylguanidine) by Marshall, Bratton, White and Litchfield<sup>1</sup> (1940) for the treatment of bacterial infections of the intestine, independent studies by Foster, Christensen and Habermann<sup>2</sup> and by Levine<sup>3</sup> showed that this drug is of value in the control of coccidial infections of sheep and poultry. Levine reported that sulfaguanidine showed considerable promise as a preventive but not as a curative agent for coccidiosis of chickens. A mash containing 0.5 per cent of the drug fed two to four days prior to inoculation of the birds and continuously thereafter for the duration of the experiment prevented infections with *Eimeria praecox*, *E. mitis*, *E. maxima* and *E. hagani*. Greater concentrations of the drug were necessary to prevent severe infections with *E. tenella* and *E. necatrix*. The feeding of this drug in the mash in 1 per cent concentrations had a marked inhibitory effect on infections with *E. tenella*, while concentrations of 1.5 per cent were necessary to be effective against *E. necatrix*. No ill effects were observed in any of the birds following the short periods of treatment.

The present studies were conducted at the Beltsville Research Center of the U. S. Department of Agriculture, Beltsville, Md., to determine the effect of treatment with sulfaguanidine on 2-week-old Rhode Island

Red chicks inoculated with *E. tenella*. The criteria used were oöcyst production, clinical manifestations, weight changes, mortality and pathologic changes.

## MATERIALS AND METHODS

The birds for experimental purposes were obtained as day-old chicks from the Animal Husbandry Division of the Bureau of Animal Industry. As soon as they were received, they were put in sterilized, metal brooders, where they were kept for the duration of the experiment. The brooders were equipped with electrical heating units, outside feeders and waterers, wire floors, and removable metal trays for droppings. The room in which the chicks were isolated was screened to prevent contamination by flies or other arthropods. The feed was kept in covered cans in the room where the experiments were conducted and water was obtained from a tap in the same room.

The ration was one recommended as a diet suitable for growing chicks and consisted of the following ingredients:

	Per Cent
Ground yellow corn meal.....	30.0
Finely ground oats.....	10.0
Wheat middlings.....	10.0
Wheat bran.....	10.0
Dried skim milk.....	10.0
Meat scrap.....	10.0
Alfalfa-leaf meal.....	8.0
Soybean meal.....	10.0
Ground limestone.....	1.0
Salt.....	0.5
Cod liver oil.....	0.5

The medicated feed used in these experiments consisted of four lots of the mash to which had been added 1, 2, 3 and 5 per cent by weight of sulfaguanidine.

For measuring oöcyst output dilution counts were made of the oöcysts present in the droppings collected on the seventh and eighth days. All of the droppings passed during a 24-hour period were collected and weighed. Water in an amount equal in weight to that of the droppings was added and the resulting suspension was thoroughly mixed with an egg beater. Sixteen grams of the suspension was placed in a glass cylinder and water was added to the 240-cc. mark, making a dilution of 1:30. Lead shot were added and the cylinder was stoppered and shaken thoroughly. A sample of the mixture was withdrawn from the cylinder

\*From the Zoölogical Division, Bureau of Animal Industry, U. S. Department of Agriculture.

<sup>1</sup>Marshall, E. K. Jr., Bratton, A. C., White, H. J., and Litchfield, J. T. Jr.: Sulfanilylguanidine: a chemotherapeutic agent for intestinal infections. *Bul. Johns Hopkins Hosp.*, lxxvii (1940), pp. 163-188.

<sup>2</sup>Foster, A. O., Christensen, J. F., and Habermann, R. T.: Treatment of coccidial infections of lambs with sulfaguanidine. *Proc. Helminth. Soc. Washington*, viii (1941), pp. 33-38.

<sup>3</sup>Levine, P. P.: The coccidiostatic effect of sulfaguanidine (sulfanilylguanidine). *Cornell Vet.*, xxxi (1941), pp. 107-112.

and strained into a test tube through a wire mesh having 38 squares per linear inch. Counts of the oöcysts present in the suspension were made with a Fuchs-Rosenthal counting chamber 0.2 mm. deep. One count was made from an unstrained sample and at least three counts were made from the strained sample. These were averaged and a calculation was made of the number of oöcysts present in 1 Gm. of droppings.

In order to detect the presence of oöcysts too few to be found in the dilution, the sugar flotation method was used. A sample of the droppings was thoroughly mixed with water and strained through cheesecloth into a centrifuge tube. This material was centrifuged for three minutes, the supernatant liquid poured off and the sediment thoroughly mixed with a small amount of sugar solution (sp. gr. 1.200). Enough sugar solution was then added to bring the level of the mixture within 1 cm. of the top of the tube and this was centrifuged for three minutes. The oöcysts were transferred to a slide by removing the surface film with a glass rod. This method also was used in examining scrapings from the duodenum, small intestine and ceca.

The same strain of *E. tenella* was used throughout these experiments. Material for inoculation was obtained from the ceca of susceptible chicks on the seventh day after infection. It was kept in 0.2 per cent potassium dichromate solution for two to three days to permit sporulation of the oöcysts, then washed repeatedly in distilled water and strained. Counts of the sporulated oöcysts in the inoculum were made with the aid of a Fuchs-Rosenthal counting chamber. Three counts were made and averaged. From this average the number of oöcysts present in a cubic centimeter was calculated.

Infection was accomplished by introducing the culture into the esophagus of the test bird with a calibrated pipette.

All birds upon which necropsies were performed during and at the termination of these experiments were examined for gross lesions of intestinal coccidiosis; none was found. Sugar flotations of scrapings from the duodenum and small intestine of at least five birds of each group in experiments I and II were made and no coccidia were found.

#### EXPERIMENT I

One hundred and fifty 16-day-old chicks were weighed and divided into six groups of 25 each. The birds were paired according to weight, so that for each group of 25 experimental birds there was a corresponding group of control birds of similar weight. Three chicks of the same age were held as uninoculated controls and are hereinafter referred to as group 7.

Birds of group 1 received the 1 per cent sulfaguanidine mash for three days prior to inoculation with 43,000 oöcysts and for nine days thereafter, when all but two birds were killed and necropsies performed. The birds were weighed on the day they received the first dose of medicated mash, on the day they were inoculated and on the sixth and ninth days after inoculation. Birds of group 2 were treated the same as those of group 1, except that they received a 2 per cent medicated mash. Birds of group 3 were inoculated with 43,000 oöcysts at the same time as those of group 1. They were fed unmedicated mash until blood appeared in the droppings; this occurred at the end of the fourth day after inoculation. These birds were then fed a 5 per cent medicated mash until the end of the test. All but two of the survivors were killed and necropsies performed on the ninth day after inoculation.

The birds of groups 4, 5 and 6 were fed regular mash throughout the course of the experiment. They were inoculated with the same dose of *E. tenella* on the same day as were the birds of the experimental groups.

Table I shows the general results of this experiment. Graph 1 indicates the average weight gains of each group. Following inoculation all birds in groups 3, 4, 5 and 6 exhibited typical symptoms of cecal coccidiosis while birds of groups 1 and 2 remained normal in appearance. After administration of 5 per cent medicated mash to the birds of group 3, their droppings became diarrheic and remained so until the end of the experiment. The usual bloody diarrhea of cecal coccidiosis cleared up in control groups 4, 5 and 6. Seven birds from each of the control groups and five from group 3 died of cecal coccidiosis.

No oöcysts were found in the dilutions of the droppings of groups 1, 2 and 3; a few were present in flotations from the droppings of birds of groups 1 and 3, but none was detected in those from group 2. In contrast to this small oöcyst output of the birds on medicated feed, the numbers per gram of droppings collected from groups 4, 5 and 6 on the seventh and eighth

days after inoculations were 3,005,000 and 553,000, respectively.

At necropsy typical cecal lesions were found in all of the inoculated control birds and in the birds of group 3. No gross lesions, no indication of hemorrhage and no cecal cores were found in chicks of groups 1, 2 and 7. Flotations made from scrapings of the cecal walls and cecal contents of the three chicks of group 7 and of five birds taken at random from group 2 were negative for coccidia. Graph 1 shows that the chicks fed 1 per cent medicated mash gained more weight than those fed 2 per cent medicated mash. This graph also shows that during the course of the disease the birds fed unmedicated mash gained more than those treated with 5 per cent sulfaguanidine.

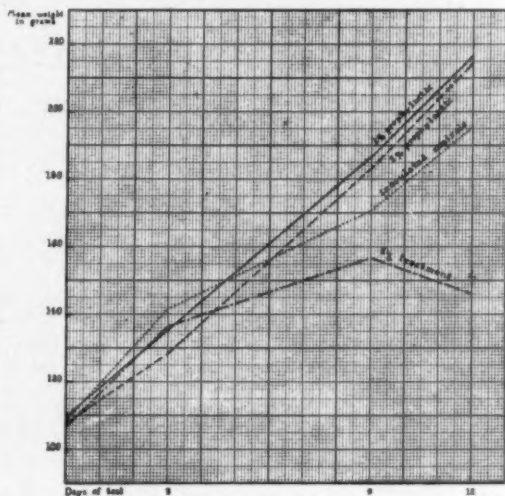
#### EXPERIMENT II

One hundred and seventy-five 12-day-old chicks were weighed and distributed into seven groups of 25 birds each. The birds were paired off so that for each group of 25 there was a corresponding group of similar weight. Each bird was weighed at the end of the third, ninth and twelfth day of the test, when the experiment was terminated. Necropsy was performed on all birds dying during the experiment, as well as those remaining at the end of the experiment.

Birds of group 1 received 1 per cent sulfaguanidine mash for three days before inoculation with 95,000 oöcysts of *E. tenella* and continuously thereafter for the duration of the test. Birds of group 2 were treated the same as those of group 1, except that the former were fed 2 per cent sulfaguanidine mash. Birds of group 3 were inoculated at the same time and with the same dose of oöcysts as those of groups 1 and 2. They received the unmedicated mash until a trace of blood appeared in the droppings; this occurred in the early part of the fourth day after inoculation. From this time on to the end of the experiment they received a 3 per cent sulfaguanidine mash. Birds of groups 4, 5 and 6 served as inoculated controls. One of them became crippled and was eliminated on the

third day. At necropsy the cecal cores of five of these birds were ground with mortar and pestle and examined for oöcysts by the sugar flotation method. Masses of oöcysts were found in all cases. Birds of group 7 served as uninoculated controls.

The general results of this experiment are shown in table I. Graph 2 shows the average weight gains of the individuals of each group. The birds receiving the 1 per cent medicated mash manifested no clinical symptoms of coccidiosis and none died dur-



Graph 1. The curves represent the mean gain in weight over a period of twelve days. The chicks were inoculated on the third day of the test.

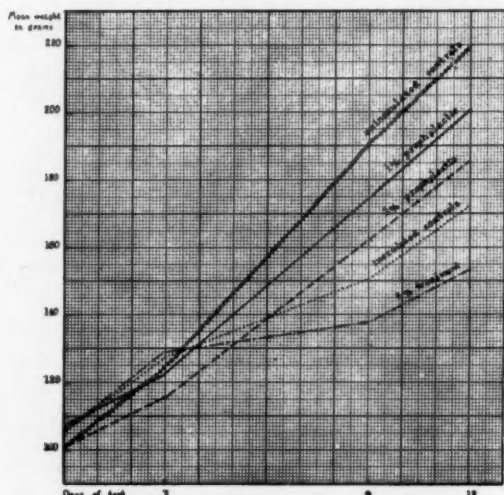
ing the course of the experiment. They gained steadily in weight, but their gains were not as great as those of the uninoculated controls. No oöcysts were found in dilutions of the droppings and none was recovered from flotations. At necropsy nine days after inoculation only one bird out of the 25 showed any gross lesions. One cecum of this chick contained a clot of dark red blood. A number of schizonts were present in the walls of this cecum, but flotations from scrapings revealed no oöcysts.

There were no clinical symptoms of coccidiosis in the chickens receiving the 2 per cent medicated mash. No coccidia were found in the dilutions of or in flotations from the droppings. At necropsy nine days after inoculation the ceca were all normal in appearance. No oöcysts or other coccid-



ial forms were found in flotations from scrapings of the cecal walls of five birds taken at random from this group. However, the average weight gain was less than that of the birds receiving 1 per cent sulfaguanidine.

All of the birds receiving the 3 per cent medicated mash after blood appeared in the droppings became droopy. Their droppings contained considerable blood for two days and three of them died of cecal coccidiosis.



Graph 2. The curves represent the mean gain in weight over a period of twelve days. The chicks were inoculated on the third day of the test.

There were no oöcysts present in the dilutions or flotations of droppings. However, at necropsy all birds were found to have typical cecal lesions and cores. A number of oöcysts were found in flotations made from cecal scrapings and cecal cores, but these were few in comparison with the number of oöcysts present in similar flotations from inoculated controls. The average weight gains of these birds were less than those of the inoculated controls.

Of the 74 inoculated birds fed unmedicated mash, 29 died of cecal coccidiosis. Their droppings contained considerable blood for three days. The dilution count made on the seventh day after inoculation showed 1,117,000 oöcysts per gram and on the eighth day, 328,000. At necropsy, nine days after inoculation, all birds of this

group showed typical cecal lesions. The average gains in weight for this group were less than those of groups 1 and 2, but greater than those of group 3.

The uninoculated controls, group 7, gained steadily in weight during the course of the test. As shown in graph 2, their average weights were greater than those of any other group. At necropsy, it was found that they had picked up a very light infection with *E. tenella*. The ceca were normal in appearance, but a few oöcysts were found in flotations from scrapings of the cecal walls and contents. No oöcysts were found in flotations from the duodenum and small intestine.

### EXPERIMENT III

To determine whether the birds in groups 1, 2 and 3 of experiment I were susceptible to reinfection following the discontinuation of the feeding of sulfaguanidine, they were reinoculated with 95,000 oöcysts of *E. tenella* 29 days after the termination of experiment I. All six birds were clinically affected and one, which had received 1 per cent sulfaguanidine for twelve days in the former experiment, died of cecal coccidiosis. The remaining five of these birds were killed on the seventh day after reinfection and all showed severe cecal lesions.

### DISCUSSION

The data obtained in experiments I and II indicate that chickens fed 1 per cent sulfaguanidine before and after inoculation were probably all lightly infected with cecal coccidiosis. It is interesting to note that this infection was revealed in the chicks of group 1, experiment I, by the presence of a few oöcysts in the droppings, while it was revealed in group 1, experiment II, only by the presence of schizonts and a blood clot in the cecum of one bird.

During the course of both experiments no coccidial forms and no lesions were found in birds fed a 2 per cent medicated mash before and after inoculation.

Severe lesions, profuse hemorrhage and some deaths occurred when treatment with sulfaguanidine was not initiated until after the appearance of blood in the droppings.

TABLE 1—Tests with Sulfaguanidine

EXPERIMENT	BIRDS USED			AMOUNT OF DRUG ADDED TO MASH	MEAN ORIGINAL WEIGHT (GRAMS)	MEAN GAIN (GRAMS)	HEMORRHAGE	GROSS LESIONS	MORTALITY (No.)	MORTALITY (%)
	GROUP	No.	AGE (DAYS)							
1	1	25	16	1% for 3 days before inoculation and 9 days after	109.9	106.6	None	None	0	0
	2	25	16	2% for 3 days before inoculation and 9 days after	107.8	106.6	None	None	0	0
	3	25	16	5% at first appearance of blood to end of test	106.6	39.4	Marked	Marked	5	20
	4, 5, 6	75	16	None; inoculated controls	108.8	86.9	Marked	Marked	21	28
2	1	25	12	1% for 3 days before inoculation and 9 days after	107.2	93.1	None	Slight	0	0
	2	25	12	2% for 3 days before inoculation and 9 days after	100.7	84.7	None	None	0	0
	3	25	12	3% at first appearance of blood to end of test	105.2	47.9	Marked	Marked	3	12
	4, 5, 6	74	12	None; inoculated controls	105.5	67.1	Marked	Marked	20	39.2
	7	25	12	None; uninoculated controls	100.8	118.2	None	None	0	0

The oöcyst output of the treated birds, however, was markedly less than that of the inoculated controls.

A study of the data presented in graphs 1 and 2 shows that during the three days prior to inoculation those groups receiving either the 1 or 2 per cent medicated mash gained less weight than those receiving unmedicated mash. However, during the course of the disease the gains of the former were greater than those of the inoculated controls, and of those treated with either a 3 or 5 per cent medicated mash. The groups given a 3 and 5 per cent sulfaguanidine mash at the first sign of blood suffered the greatest retardation in growth rate. The uninoculated controls gained considerably more weight than any other group.

#### SUMMARY

Birds fed a 2 per cent sulfaguanidine mash for three days before inoculation with *E. tenella* and for nine days thereafter showed no symptoms, lesions or coccidial forms.

Birds fed a 1 per cent sulfaguanidine mash over the same period developed very light infections, but showed no symptoms or severe lesions.

Birds receiving either a 3 or 5 per cent sulfaguanidine mash daily after the appear-

ance of blood in the droppings were not significantly benefited, although oöcyst production was sharply reduced.

Birds protected from an initial infection of cecal coccidiosis by sulfaguanidine were highly susceptible to a reinoculation of 95,000 oöcysts 29 days later.

The average gain in weight of the inoculated controls was less than that of the birds receiving prophylactic doses of sulfaguanidine mash, but greater than that of the birds receiving medicated mash as a curative agent.

Knowing that the easiest way to sell something is to make it hard to get, some dealers in farm equipment are telling farmers falsely that they must have a priority rating.

The *Poultry Tribune*, popular poultry magazine, advises farmers to begin buying their baby chicks early this year. Early-hatched chicks grow faster than late-hatched ones, the mortality is lower and hatcherymen give early season discounts. But the main advantage is the early fall egg crop.

## Sales-Barn Problems\*

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SALES-BARN PROBLEMS might be considered a controversial subject, depending entirely upon one's relationship to sale barns. These could be classified as problems of (1) the livestock sanitary officials, (2) the livestock farmer, (3) the sales-barn operator and (4) the sales-barn veterinarian. Of course, the principal problem is the spreading of livestock diseases through community auction sales.

In the majority of states the greatest handicap is the lack of adequate sales-barn laws and lack of a proper set-up for the enforcement of whatever laws there may be. Many states, such as Iowa, do not have such laws, but the sales barns are governed entirely by state regulations which, in many instances, are difficult to enforce.

Another major problem is the unwillingness on the part of many sales-barn operators to comply with laws and regulations that would assist materially in preventing the spread of livestock diseases, and who will, at every opportunity, try to get by with as much as possible. Such parties are assisted by dishonest traders and scalpers who consider the sales barn a legitimate outlet for their diseased and exposed livestock.

However, all of this trouble can not be blamed on these parties. There are many cases where a so-called honest and respectable farmer calls a truck to take from his premises livestock he knows to be diseased or exposed to disease to a sales barn within a radius of 50 to 100 miles.

Often this class of livestock is brought in after the sale has started. When the animals are kept on the move, it is difficult for the veterinary inspector to detect anything wrong with them.

Many sales barns are so constructed that it is impossible to keep them in any sem-

blance of a sanitary condition. Unless a state has laws as to construction, it is impossible to require concrete flooring in the pens and alleys.

I firmly believe that a great many livestock diseases are transmitted by the use of trucks that are not kept properly cleaned and disinfected. Sometimes healthy animals contract disease enroute to sales barns as well as traveling from the sales barns back to the farms.

The appointment of a veterinary inspector for a sales barn presents an important problem, as the veterinarian appointed is usually a local practitioner, a high percentage of whose clients are the buyers and sellers of the livestock. Therefore, he is inclined to be too cautious in his rejections.

I have been asked by several veterinarians just how strict we expect them to be and, when so advised, they indicated that if our rules were followed, it practically would close their sales barns. This would suggest that these establishments are being used, to a large extent, as a clearing house for diseased livestock.

### FEEDER HOGS

Feeder hogs present the greatest problem of all classes of livestock sold through sales barns. Many times the exact origin of such hogs or what diseases they have been exposed to is not known, with the result that cholera, erysipelas and various forms of infectious enteritis are spread continually through our sales barns.

At the present time the majority of the states require that all unvaccinated hogs must be vaccinated with anti-hog-cholera serum and virus by a licensed veterinarian before being released from the sales barn and that they be quarantined to the purchaser for a period of not less than 21 days. If the dose of anti-hog-cholera serum is increased about 50 per cent over the normal amount, this will take care of the cholera problem, provided that the hogs are not

\*Presented before the Section on Sanitary Science and Food Hygiene at the seventy-eighth annual meeting of the AVMA, Indianapolis, Ind., August 11-15, 1941.



coming down with cholera at the time of vaccination. Also, where generous doses of anti-hog-cholera serum are used, we do not have much trouble with severe outbreaks of enteritis following vaccination. Some benefits are derived even in hogs that might be suffering from swine erysipelas.

Personally, I am of the opinion that all hogs should lose their identity, as far as vaccination is concerned, when they go into the sales ring because most states will accept vaccination certificates at sales barns covering hogs that are supposed to have been vaccinated previously by a licensed veterinarian. In many instances we find that the trader has substituted unvaccinated hogs, which is not hard to do as many of these certificates are made out to cover a given number of "mixed hogs" and no weights are listed. As a rule, the purchasers sustain a heavy loss when buying these so-called longtime vaccinated hogs. Such losses are uncommon in hogs vaccinated at the sales barn. At this time many buyers have all of the hogs that they buy at sales barns vaccinated, regardless of whether they were sold as vaccinated or unvaccinated. The marking of hogs with ear tags has not proved entirely satisfactory.

#### SHEEP SCAB

Sheep scab also presents a major problem at sales barns in the Midwest. Anyone who has had experience with sheep scab has little difficulty in picking out those sheep showing symptoms of scab and, if he is so inclined, can retain the infected sheep on his premises while taking the remainder of the band to a sales barn. Such exposed sheep, after being resold through the sales barn, will show positive evidence of scab in from 30 to 60 days.

When scab is found in a band of sheep thus sold, it is necessary for the sanitary officials to make a complete investigation to determine the names and addresses of the purchasers of sheep that originated from this same band. By the time they are traced down, sometimes 40 or 50 bands are involved over quite a portion of the state. It then becomes necessary for all infected or exposed sheep to be dipped twice under

official supervision and quarantined for a period of at least 90 days following the date of the last dipping.

In Iowa, weather permitting, we require all sheep that are not going direct to market for slaughter to be dipped under veterinary supervision at the sales barn before being released. Should the purchaser take the same sheep to another sales barn, they are handled as undipped sheep and again required to be dipped before being released.

During the winter months, when it is not advisable to dip, sheep going back to the farms are marked with branding paint and quarantined for a period of at least 60 days. Some of the midwestern states that have not been following these precautions now are experiencing a high incidence of sheep scab.

#### CATTLE

The sale of cattle, especially dairy and breeding cattle, also presents its problems. There is no question that many of these animals are previous aborters or are infected with Bang's disease. Our laws should require such cattle offered for sale to be accompanied by an official certificate showing they were negative to the agglutination test for Bang's disease within a period of 60 days before date of sale or, if not accompanied by a certificate, that they be held at the place of sale until such tests have been made. Furthermore, all reactors should be identified properly and shipped to market for slaughter.

Some years ago, when sales barns were springing up all over the country, bovine tuberculosis presented a very grave problem. Now that all states are modified accredited areas and all infected herds are kept under strict quarantine until they pass two or three clean tests, bovine tuberculosis no longer is a serious problem.

The sale of feeder cattle at our sales barns presents about the same problem that one will find at a central market. There is always some danger of certain diseases, such as pneumonia and pink eye. Sales-barn operators always have stressed the point that their feeder cattle are fresh from the range and, consequently, not exposed to

those diseases commonly found in our central markets. However, this means nothing, as the cattle going through sales barns are exposed to as many diseases as cattle passing through any central market.

#### LEGAL ASPECTS

Many farmers who market their livestock through sales barns claim that their livestock is not presented for sale until all of the scalpers' consignments are sold. Thus, by the time the farmers' livestock is presented, the demand has been exhausted and the trader can buy the local sellers' animals at a lower price and take them on to the next sales barn and make a generous profit.

Livestock sanitary officials in states where sales barns are operated receive letters daily in regard to the losses the purchasers have sustained following the buying of hogs and cattle at sales barns. In a great many instances this is not the fault of the operators or the veterinary inspectors, but is the fault of the seller who knowingly sold diseased or exposed livestock.

Our laws should require that a bill of lading accompany each consignment of livestock to a sales barn. This billing should show the proper name and address of the owner, the place and time the livestock was loaded, as well as a statement by the owner as to the length of time he owned the livestock and that to the best of his knowledge the animals have not been exposed to disease.

The time has come when the public as a whole should be aroused to the need of proper sanitary laws governing sales barns to prevent the further spread of livestock diseases. There are many operators who conduct their sales in just as satisfactory a manner as the sale of livestock through our central markets. Many of these operators would welcome and assist in the passing and enforcement of proper legislation. No legislation would be satisfactory unless it carried a sufficient appropriation for enforcement.

It is further necessary that the state employ a sufficient number of supervising veterinarians to check on all sales barns in their respective districts. If not so super-

vised and checked on, each sales barn would have its own set-up and interpretation of the law. It is difficult to enforce such a law unless there is complete uniformity in interpreting it on the part of the veterinary inspectors and the operators throughout the state.

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#### Is "Shoot on Sight" Out of Order?

Mrs. Paul Ehrlich is a refugee from Germany, too timid to speak her mind lest relatives abroad might suffer. She is the elderly widow of Paul Ehrlich, known during his life as a lovable character and a far-seeing man of medical science. He is the father of scientific chemotherapy—the discoverer of salvarsan. Who of the older generation was never thrilled by his prolific mind?

At a meeting commemorating the discovery of salvarsan, the American Social Hygiene Association presented Mrs. Ehrlich with a check for \$1,000, a friendly and obviously a needed donation. In making the presentation, Surgeon General Parran of the U. S. Public Health Service, leader in the social hygiene campaign, placed Paul Ehrlich among the immortals of medicine along with Pasteur, Lister and Koch.

But why take time out to sing requiem for the dead while their living prototypes, not able to escape to foreign countries, starve in concentration camps?

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British pigs are the toughest of farm animals. They sleep through air raids even when roofs overhead are wrecked.—*Science News Letter*.

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The 1941 corn crop is estimated at 2,626,000,000 bushels, or 177 million more than 1940. The supply per animal is, however, smaller than last year. The 1941 hay crop was the largest on record.

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Most of the cod liver oil imported to the United States now comes from Iceland, Newfoundland and the maritime provinces of Canada. Other sources of supply are sardine oils fortified with vitamins A and B.

# SURGERY & OBSTETRICS

AND PROBLEMS OF BREEDING

## Bovine Sterility from a Practitioner's Viewpoint\*

J. C. CAREY, D.V.M.

*West Liberty, Iowa*

BOVINE STERILITY presents many interesting and sometimes difficult problems in practice. When cows fail to conceive, the dairyman loses because of lowered production during repeated heat periods in sterile cows and abnormally long milking periods.

To the purebred breeder of beef and dairy cattle, sterility causes huge loss and there is great need of skilled veterinary service to correct this condition.

When a large number of cows in a herd fail to conceive, the bull may be at fault. Proper diet and adequate exercise are essential if the bull is to remain fertile. Semen should be collected and a microscopic examination made. If possible, an artificial vagina should be used to collect the semen. In lieu of this, however, the cow may be served and with a sterile rubber glove on the left hand a considerable quantity of semen mixed with mucus can be extracted from the vagina into a beaker and poured into a test tube.

Three things should be looked for in the examination of semen: motility, uniformity of size and shape of the bodies, and length and shape of the tails of the spermatozoa. In many sterile bulls the bodies of the spermatozoa have an irregular shape or the tails are short and look like they have been broken off. Williams says that when abnormal spermatozoa number 170 per thousand, the bull is sterile.

Examination of cows to determine pregnancy renders a valuable service to the

owner. When in doubt, it is best to make regular examinations to determine whether or not the object that you thought was a fetus, is growing. The ovarian arteries are also a fair guide. I once examined a cow and pronounced her pregnant. A few days later I examined a cow for a neighbor of the first owner and pronounced her pregnant. Months later, when parturition should have taken place, I was called to examine the cows and found the uteri of both to be the same as when first examined.

The history of a non-breeding cow is essential and is easy to obtain if the owner keeps accurate breeding records.

A rectal examination should be made of the cervix, uterus, ovaries and fallopian tubes about one week after estrus.

A glass speculum and flashlight are used to examine the vagina and cervix. The ovaries must be observed carefully. One should learn to differentiate between a normal Graafian follicle, a corpus luteum and a cystic follicle. Normal Graafian follicles should be left intact, for their physiologic function is essential to conception.

### CYSTIC OVARIES

Cystic ovaries are the most common cause of sterility in my practice. When one ovary is involved, I rupture the cysts and examine the cow again in seven or eight days. If the cysts recur, I rupture them again, massaging the other ovary and uterus. When the cow comes in heat, she is not bred unless 18 to 21 days have elapsed since her last heat period. When

\*Presented before the Section on Surgery and Obstetrics at the seventy-eighth annual meeting of the AVMA, Indianapolis, Ind., August 11-15, 1941.



heat periods are too frequent—as an example, every ten to twelve days—and rupture of the cysts seems to do no good, I use small hypodermic injections of anterior pituitary extract, repeating the dose in about one week. This seems to retard the formation of cysts and brings about normal ovulation and heat periods in some cases.

In one case a cow developed incurable nymphomania following one injection of anterior pituitary extract. This, however, is perhaps an empirical use of the preparation, in view of the fact that it appears to act equally well on cows which fail to come in heat. In other words, it seems to have opposite actions, causing fewer heat periods in cows in which estrum occurs too often and causing cows to come in heat when estrual periods are absent.

#### RETAINED CORPUS LUTEUM

Failure of estrum may be caused by a retained corpus luteum. This should be ruptured and expressed. If no corpus luteum is present and the ovaries seem small and firm, massage of the ovaries and uterus once a week is beneficial. Anterior pituitary extract may be tried. Pregnant mare's serum (gonadin) has not been used with success in my practice, although Dr. Walsh of Iowa State College reports good results in a few cases.

#### VITAMIN C THERAPY

Ascorbic acid, or vitamin C, is of value in treating two classes of cows: (1) those which show no changes in their reproductive organs and, although bred regularly, continue to come in heat every 21 days, and (2) those which are bred and skip two or three heat periods, and then again come in heat. Ascorbic acid is given in doses of 1 to 2 Gm. hypodermically and repeated in seven days.

Phillips and his coworkers at the University of Wisconsin have done considerable work on the vitamin C, or ascorbic acid, content of the semen of bulls and the blood plasma of cows. As the vitamin C content is very high in the corpus luteum, it has

been found that hypodermic injections of ascorbic acid aid in the implantation of a firm corpus luteum; by assisting implantation, ascorbic acid thereby hastens conception.

Dairy or beef cows on dry feed are more prone to breeding troubles than cows on pasture. This proves that vitamins are essential to conception and the development of the fetus.

#### TREATMENT OF APPARENTLY NORMAL HEIFERS WHICH FAIL TO CONCEIVE

In some herds one may encounter one or more heifers which, although bred numerous times and apparently normal in every respect, fail to conceive. In treating such heifers, I use a preparation called "parat leaves." Parat leaves are absorbent papers impregnated with acriflavine, methylene blue and zinc sulfate. The papers are placed well up in the vagina with long dressing forceps and the treatment is repeated in seven days. The heifer is bred at the next heat period. My clients call it the paper treatment and seem to be of the opinion that it is effective. They ask to have it used on other non-breeding heifers.

#### METRITIS

Metritis is characterized by a purulent discharge. When the cow lies down, white, thick material is discharged from the vulva and the tail is smeared. On rectal examination the uterus is enlarged. These cases will yield to treatment if there are no adhesions of the uterus with surrounding organs, if the uterine wall is not too much thickened and if salpingitis is not present.

In treating metritis, rupture the corpus luteum, if there is one. The cervix is fixed with uterine forceps and dilated with a dilator. A flexible metal horse catheter is passed into the uterus. Gentle massage is applied per rectum to the uterus and if the pus is not too thick, some will be expelled through the catheter. A small amount of physiologic salt solution or 0.5 per cent Lugol's solution may be pumped in and massaged out. Four to eight ounces of 0.5 per cent methylene blue in glycerin may

be injected into the uterus and allowed to remain. Never use more than 8 oz. Rubber gloves should be used to avoid staining the hands with methylene blue.

#### CERVICITIS

Cervicitis is a common cause of sterility. A pledget of cotton is placed on an applicator that is long enough to reach the cervix, working through a glass speculum. Artificial light is used to illuminate the vagina and the cervical canal is swabbed with pure Lugol's solution. One must be careful to spill as little as possible into the vagina.

#### COMMENT

In treating cases of sterility in a mixed practice, one does not always have as much time as he should and must endeavor to effect a cure in a manner that interferes least with his other work. In this paper I have described my routine methods of treatment which, I believe, can be used by anyone in the field. These methods have gained fair results for me.

#### A New Anesthetic: Cyprome Ether (= Cycloprophyl Methyl Ether)\*

The molecular union of cyclopropane and methyl forms cyprome ether, a volatile liquid possessing anesthetic properties more potent than ether, but less potent than chloroform. The concentration in the blood of dogs that produces surgical anesthesia is 2.31, that of ethyl ether 1.76.

Cyprome ether does not produce liver damage in monkeys or liver or kidney damage in rats after repeated trials. The cardiac toxicity in frogs is about the same as that of ether, perhaps slightly more. The explosive range appears to be about the same as ether with oxygen and air. The oil/water coefficient is 49 per cent greater, its concentration in air required to induce anesthesia from one half to two thirds less, and the boiling point 9.5 C. higher than ether.

In dogs the blood pressure remains high

and the pulse good under deep anesthesia induced with cyprome ether. It may be administered in a variety of ways: open drop, open drop with oxygen added under the mask, closed circuit induced with nitrous oxide and oxygen, and closed circuit with oxygen alone, in each case without premedication. In laboratory animals the potency is greater than that of ether and in man the period of induction is shorter and the amount required less. The higher boiling point lessens its dissemination in the surrounding atmosphere during administration. Induction with nitrous oxide seems preferable, although smooth effects are obtained with cyprome ether alone. In human patients there is a tendency to breath-holding owing possibly to laryngeal irritation. Laryngeal spasm occasionally occurs.

#### A Precocious Mare

We are indebted to G. O. Smith, practitioner of Ligonier, Ind., for this illustrated report of an unusually precocious filly. At 4 days less than 2 years old, she gave birth to the colt shown herewith. The dam was born near Ligonier, May 16, 1939,



Dr. Smith and his precocious patients.

and foaled May 12, 1941. "Not that the animals are so fine," the Doctor points out, "but they certainly represent an unusual event in breeding horses. In other words, the filly was less than 13 months old when bred."

\*Krantz, John C., Jr., et al., Department of Pharmacology, School of Medicine, University of Maryland. *Anesthesiology*, 1 (Nov. 1940), pp. 274-279.

# Cesarean Section in the Cow\*

E. R. FRANK, D.V.M., M.S.

Manhattan, Kan.

SUCCESSFUL PERFORMANCE of a cesarean section may result in saving either the mother or young, or both. Many pregnant cows have been destroyed which could have been saved by this operation. It is indicated in cases where there is deformity of the maternal pelvis, and in some cases of fetal monsters. In recent years we have had an increasing number of young, immature heifers with small pelvises presented for treatment. A cesarean section in these cases has saved a long, difficult embryotomy with death of the fetus and sometimes the mother. In our opinion, it is preferable to an embryotomy when the fetus is still alive and there is a possibility of saving its life by an operation.

From the results obtained in operating on cases of emphysematous fetus, we believe that a cesarean section is the best procedure for this condition.

Many practitioners (Ferguson,<sup>1</sup> Witt,<sup>2</sup> Glenney,<sup>3</sup> Curtis,<sup>4</sup> Simpson,<sup>5</sup> Ouderkirk,<sup>6</sup> Isham<sup>7</sup> and others) have reported excellent results from cesarean section in the cow.

The percentage of recoveries will depend upon the care with which the patients are selected. If they are in poor condition and weak or have been allowed to labor too long, their chances of recovery are lowered. Also, if attempts have been made to remove the fetus, they are poor operative risks. In

the 40 cases we have operated on the past two years as they were presented in the clinic, 60 per cent have recovered. If we eliminate those which were unfavorable to be operated on, the percentage is 85.

## OPERATIVE TECHNIC

The type of anesthesia used varies with the preference of the operator. Some operators prefer to give a basal anesthetic of either chloral hydrate or nembutal and then infiltrate the tissue along the proposed line of incision with a 1 per cent solution of a local anesthetic. Regional nerve blocking (paravertebral lumbar anesthesia) may be used. This method consists in injecting 10 cc. of a 2 per cent solution of a local anesthetic over the last thoracic and first two lumbar nerves. Epidural anesthesia may be used; the amount and strength of local anesthetic solution varies with the size of the patient. For small heifers 40 cc. of a 2 per cent solution of procaine hydrochloride is sufficient, while for older and larger cows it may be necessary to use 50 cc. of a 2.5 per cent solution.

## OPERATIVE AREA

The location of the operative area varies with the preference of the operator and the individual case. Probably in the largest percentage of cases the operation is performed in the flank regions. The incision, usually 12 to 18 in. long, is made through the skin, muscles and peritoneum. Gotze of Germany performs the operation through an incision on the ventral surface of the abdominal cavity 3 in. lateral to the left subcutaneous abdominal vein. We prefer to make the incision on the right side of the median line and half way between it and the subcutaneous abdominal vein.

On the right side of the median line an area 10 in. wide is shaved from the udder forward as far as the umbilicus. The skin

\*From the Department of Surgery and Medicine, Kansas State College; presented before the Section on Surgery and Obstetrics at the seventy-eighth annual meeting of the AVMA, Indianapolis, Ind., August 11-15, 1941.

<sup>1</sup>Ferguson, T. H., S. E.: Cesarean section in cows. No. Am. Vet., xv (Sept. 1934), p. 25.

<sup>2</sup>Witt, B.: Veterinary obstetrics. Vet. Med., xxxii (Jan. 1937), p. 24.

<sup>3</sup>Glenney, W. C.: Cesarean section in large animals. No. Am. Vet., xx (Dec. 1939), p. 43.

<sup>4</sup>Curtis, H.: Cesarean section in the cow. *Ibid.*, xx (March 1939), p. 21.

<sup>5</sup>Simpson, W. M.: Cesareotomy saves cow and calf. *Ibid.*, viii (July 1927), p. 23.

<sup>6</sup>Ouderkirk, R. E.: Successful cesareotomy in a cow. *Ibid.*, ix (Sept. 1928), p. 29.

<sup>7</sup>Isham, R. E.: Cesareotomy in a cow. *Ibid.*, x (August 1929), p. 39.



is cleansed thoroughly with carbon tetrachloride, and cotton saturated with a 1:1,000 solution of bichloride of mercury in alcohol is applied on the skin.

A skin incision approximately 12 in. long is made half way between the median line and the subcutaneous abdominal vein. It usually extends from the udder as far forward as the umbilicus. The posterior portion of the body is now rotated so it is in dorsal recumbency. Sterile rubber gloves are put on, and the operative area is covered with a sterile sheet. An opening is made in the sheet corresponding to the skin incision. The incision through the aponeurosis of oblique abdominal muscles and peritoneum corresponds to the skin incision. It can be made with a scalpel or scissors, preferably with scissors. When the peritoneal cavity is opened, the omentum is usually found covering the uterus. By grasping its posterior edge the omentum can be pulled forward, exposing the uterus. One hand is introduced into the peritoneal cavity to locate the end of the pregnant horn and bring it through the incision. The horn should completely fill the opening to prevent the prolapse of any intestine. The posterior portion of the cow is now returned to lateral recumbency.

The incision through the wall of the uterus should be made so that none of the cotyledons will be injured. Their location can usually be determined by palpation of the uterine wall.

To prevent laceration of the uterine wall the incision should be large enough to permit passage of the fetus. After the fetus is removed the placenta also should be removed if it is not too tightly attached. If the placenta is removed at this time, the uterine involution occurs rapidly. The exposed portion of the uterus should be moistened and cleansed with sterile physiologic saline solution.

The incision in the uterus is closed with two rows of continuous Lambert sutures. We prefer to use No. 1, 20-day chromic catgut with a traumatic needle for suturing the uterus. The exposed portion of the uterus is again moistened with sterile physiologic solution before it is returned to

the peritoneal cavity. The incision through the aponeurosis and peritoneum is closed with one continuous suture bringing the edges of the incision in close apposition. The suture material may be No. 5, 20-day chromic catgut, silk or umbilical tape.

#### AFTERCARE

Immediately after the operation 500 cc. of a 25 per cent solution of dextrose is given intravenously. It is also important to assist the patient to assume the normal position of sternal recumbency.

If the uterine muscles are atonic and they seem to need stimulation, we inject 10 cc. of pituitary extract within 24 hours. This usually is administered into the epidural space. By experimental work Benesch found that for five days following parturition if pituitary extract is given epidurally it produces a stronger, longer and more continuous action. If the placenta is not expelled in 48 to 72 hours, attempts should be made to remove it. If there is any infection in the uterus a pint to a quart of liquid Bipp is injected into the uterus. This treatment may be repeated every 24 or 48 hours, or whenever it seems to be indicated. The skin sutures should be removed in 10 to 14 days.

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A subject worth discussing among animal pathologists is whether the term "metastasis," properly speaking, can be applied to melanomas of the gray horse. In other words, are melanomas of this class multiple tumors due to a common cause or metastatic tumors implanted by "seeds" from the initial growth?

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Metrazol, the respiratory stimulant employed in veterinary medicine to revive surgical patients from the effect of overdosing with nonvolatile anesthetics, may be useful in treating the shock produced by the explosion of bombs, according to experiments on rats conducted at the University of Michigan by Norman R. F. Maier.—*From Science News Letter.*

# Clinical Observations on the Use of Equine Gonadotropin in the Mare and Cow\*

H. S. CAMERON, D.V.M., M.S., Ph.D.

*Davis, Calif.*

A RETAINED corpus luteum, characterized by a dormant estrous cycle following parturition or following a coitus from which conception did not result, is a frequent cause of sterility in the mare and cow. In the cow the condition is overcome by expressing the corpus through manipulation from the rectum. This procedure sometimes has undesirable sequels, such as hemorrhage or the foundation of adhesions between the cavity and pavilion of the oviduct. In the mare the corpus can not be expressed manually because it is imbedded within the ovary, not on the surface as is usual with the cow.

Although endocrine therapy has been practiced extensively in reproductive disorders, the literature seldom refers to the use of a specific hormone on a specific pathologic condition in domestic animals. Cole and Miller<sup>1</sup> showed that ovulation could be induced in the ewe by the use of pregnant mare's serum. Catchpole<sup>2</sup> suggested that the injection of gonad-stimulating hormone might restore the estrous cycle in cases where the manifestations of heat were absent, and reported its effect on two mares with such a history. As a result of the injections, both of these mares showed estrus four and eight days later. Though the small number of animals used prohibited conclusions, further investigations seemed warranted. Bhattacharya, Hammond and Day<sup>3</sup> recommended the use of equine gonadotropin only in anestrus where rectal examination reveals small, appar-

ently inactive ovaries, and they considered the injection of the hormone unnecessary where estrus could be induced by manual removal of the corpus luteum.

This paper is a report on attempts to produce estrus by injecting equine gonadotropin in mares and cows whose estrous cycle was pathologically dormant. Opportunity for this experiment was afforded in the routine care of the University breeding stock, together with observation of a commercial herd wherein the owners and the Division of Veterinary Science were co-operating in another disease investigation.

## MATERIALS AND METHODS

Two herds of dairy cattle were available, one being the University herd, the other a commercial herd some 80 miles from Davis. Although the distance of the latter herd prevented frequent observations and examinations, complete and reliable records were available. The mares were all from the University stables at Davis. Only individuals whose history showed the absence of estrus over an extended period were used in this study. In the University cattle, rectal examinations were made prior to injections, and the presence or absence of a corpus luteum was noted. In the commercial herd, this procedure was not possible. Untreated mare serum collected at the seventieth day of pregnancy and testing 200 I. U. per cubic centimeter was used. The serum was passed through a Berkefeld filter and treated with merthiolate to prevent bacterial contamination.\* Injections were made subcutaneously in a single dose of 1,000 I. U.

## PROTOCOLS

The following protocols show the result

\*This equine gonadotropin was furnished through the courtesy of Dr. H. H. Cole of the Division of Animal Husbandry, University of California.

\*From the Division of Veterinary Science, University of California.

<sup>1</sup>Cole, H. H., and Miller, R. F.: Artificial induction of ovulation and oestrus in the ewe during anoestrus. *Am. J. Physiol.*, civ (1933), p. 165.

<sup>2</sup>Catchpole, H. R.: Increasing breeding efficiency on stud farms through pregnancy diagnosis. *Vet. J.*, xc (1934), pp. 493-498.

<sup>3</sup>Bhattacharya, P., Hammond, J., and Day, F.: Treatment of cows and heifers which do not come in oestrus. *Vet. Rec.*, lili (1941), pp. 450-451.

of injecting nine mares in which the manifestations of estrus were absent.

*Case 1.*—Percheron mare bred March 4, 1940; negative to the Aschheim Zondek test 45 days later. Gonadotropin administered May 9, 1940. Bred May 15, 19, 20, 21 and 22. Conception did not occur.

*Case 2.*—Percheron mare bred March 4 and 6, 1940; negative to the Aschheim Zondek test 45 days later. Gonadotropin administered May 9. Bred May 16, 18, 20 and 21. Conception occurred.

*Case 3.*—Percheron mare foaled May 15, 1938, with placenta retained; no subsequent estrus. Gonadotropin administered June 9. Bred June 18. Conception occurred.

*Case 4.*—Percheron mare aborted December 8, 1938; no subsequent estrus. Gonadotropin administered March 29, 1939. Bred April 2. Estrus apparent one day only. Conception occurred.

*Case 5.*—Thoroughbred mare aborted in 1937; no subsequent estrus. Gonadotropin administered May 10, 1938. Bred May 11, 1938. Estrus apparent one day only. Conception occurred.

*Case 6.*—Thoroughbred mare bred March 24, 1938; negative to the Aschheim Zondek test on May 18. Gonadotropin administered May 18. Bred May 19, 21, 23, June 8, 10 and 13. Conception occurred.

*Case 7.*—Percheron mare showing no estrus since foaling on February 1, 1941. Gonadotropin administered March 12 and 28. She was bred April 1, and May 12 and 13. Conception occurred.

*Case 8.*—Mare showing no signs of estrus. Gonadotropin administered March 12, 1941. Bred March 18, April 22, April 24, and May 12, 13 and 14. Conception occurred.

*Case 9.*—Percheron mare bred; negative to the Aschheim Zondek test 45 days later. No apparent estrus. Gonadotropin administered May 8. Bred May 18, 20, 21 and July 18. Conception did not occur.

Judging from these results, gonadotropin therapy is efficient in alleviating sterility in the mare where the pathology consists of a suspended estrous cycle.

The number of cows treated does not permit including the entire group. Several cases, therefore, will be described, and the results in the entire group summarized.

*Case 10.*—Holstein cow aborted April 1, 1940. No subsequent estrus apparent. Gonadotropin administered July 19, 1940, and September 30, 1940. No response. At autopsy, October 21, a thick-walled cyst on the left ovary; an imbedded corpus luteum and numerous small cysts or ripe follicles on the right ovary.

*Case 11.*—Holstein cow aborted April 4, 1940. No estrus apparent. At examination on July 19, a small cyst on the right ovary; a very

small, inactive left ovary; uterus slightly atonic. Gonadotropin administered, but without result.

*Case 12.*—Guernsey cow calved June 15, 1940. No subsequent estrus apparent. Gonadotropin administered September 23 and 30, but without result. October 10, a corpus luteum expressed from the right ovary. October 15, gonadotropin administered. Bred October 26. Conception resulted.

*Case 13.*—Holstein cow calved January 21, 1939. No subsequent estrus. June 21, a corpus luteum on the right ovary revealed by rectal examination, but not ruptured. Gonadotropin administered June 21. Bred June 29. Conception occurred.

*Case 14.*—Guernsey cow calved February 28. No subsequent estrus. At examination, June 21, a corpus luteum revealed in the right ovary, but not ruptured. Gonadotropin administered June 21. Bred July 19. Conception occurred.

*Case 15.*—Jersey cow showing no estrus subsequent to calving. July 8, a corpus luteum in the left ovary. Gonadotropin administered. Bred July 24. Conception occurred.

*Case 16.*—Guernsey cow open, but no estrus apparent. Gonadotropin administered April 11, 1941. Bred April 18, 1941.

*Case 17.*—Holstein cow open, but no estrus apparent. Gonadotropin administered April 11, 1941. Bred June 10, 1941.

*Case 18.*—Holstein cow open, but no estrus apparent. Gonadotropin administered April 14, 1941. Bred April 18, 1941.

*Case 19.*—Guernsey cow open, but no estrus apparent. Gonadotropin administered April 14, 1941. No response.

*Case 20.*—Guernsey cow open, but no estrus apparent. Gonadotropin administered April 11, 1941. No response.

*Case 21.*—Holstein cow open, but no estrus apparent. Gonadotropin administered April 14, 1941. This animal later proved pregnant at the time of injection. She calved July 11, 1941. No apparent bad results were noted from the hormone.

The following table summarizes the results for all animals treated and shows the number of days between the injection of the hormone and the appearance of estrus.

TABLE I—Appearance of Estrus After Injection of Equine Gonadotropin

SPECIES	DAYS			No RESPONSE	TOTAL
	1-5	6-10	10-20		
Equine	3	6			9
Bovine	8	6	7	25	46



## DISCUSSION

The object in these investigations was to induce estrus irrespective of whether or not it was accompanied by ovulation. As shown by the results in the mares, the hormone was successful in stimulating the cycle. Judging from the high percentage of conceptions, ovulation also was induced in that species. In cases 4 and 5, estrus was apparent for one day only, but conception resulted in both instances.

The results in the cows were much less striking. Many of these cases were probably complicated by pathologic conditions other than a retained corpus luteum. Although in apparently uncomplicated cases of retained corpus luteum the results were mediocre, the use of a single injection of the hormone appears justified. The question of dosage has not been thoroughly investigated; perhaps an increased dosage is indicated in cows. Possibly, on the other hand, an overdose or repeated dosing may stimulate ovarian activity to such an extent as to impair the function. Such investigations are not possible under field conditions; one must conduct them with experimental animals, available for autopsy, in order to measure the activity of the ovary more accurately than is possible with a rectal examination. Bhattacharya, Hammond and Day<sup>3</sup> cautioned against a dose exceeding 1,500 I. U., and because of the danger of multiple ovulation, they advised against its use combined with removal of the corpus luteum.

With the exception of one cow, evidence of anaphylaxis was not observed. This animal developed an urticaria-like condition of the skin characterized by edematous plaques about  $\frac{1}{2}$  in. in diameter. Recovery was rapid and uneventful.

## SUMMARY

Nine mares and 46 cows were treated with equine gonadotropin in an attempt to induce estrus where the cycle was dormant. All of the mares responded within ten days, whereas 25 cows failed to respond. Judging from the results, the hormone was highly effective in mares, considerably less effective in cows.

## The Pros and Cons of Artificial Insemination of Cattle\*

F. B. HADLEY, D.V.M.

Madison, Wis.

### ADVANTAGES OR VALUES

- 1) Eliminates the cost of keeping a bull and building a bull pen.
- 2) Extends the use of desirable sires to many more cows and herds.
- 3) Avoids the danger involved in handling a bull.
- 4) Advances the herd-improvement program through better kept records.
- 5) Controls the spread of certain diseases of cattle.
- 6) Aids in detecting impotent bulls by frequent examination of the semen.
- 7) Assists in recognizing sterile cows by periodic examinations for pregnancy.
- 8) Saves the cost of transporting cows to bulls.
- 9) Increases milk production of the herd at no extra cost for feed by substituting a cow for the bull.
- 10) Makes possible the use of heavy bulls on heifers.
- 11) Permits the use of crippled but outstanding bulls.
- 12) Determines the transmitting ability of young bulls more promptly.
- 13) Raises slightly the rate of conceptions per insemination above that for natural service.
- 14) Attracts buyers desiring cattle of superior breeding.

### DISADVANTAGES OR LIMITATIONS

- 1) Entails the danger of spreading disease by semen, especially trichomoniasis.
- 2) Raises somewhat the first cost of the calf, but this is compensated by the calf's having better heritage.
- 3) Imposes the organizing and holding of both group and individual interest of small breeders.
- 4) Involves the employment of a veteri-

\*From the Department of Veterinary Science, University of Wisconsin.

# Surgery of the Horse's Foot\*

H. B. TREMAN, D.V.M.

Rockwell City, Iowa

IN CERTAIN SECTIONS of the country surgery of the horse's foot is fast becoming a lost art. In tractor sections of the Middle West the horse is no longer subjected to the severe uses which in the past resulted in many types of foot trouble. Also, the wide use of woven wire in fencing lots and pastures has done away with a great many barb-wire cuts which used to require surgical intervention. In our own practice foot surgery in the horse has been reduced tremendously. However, the occasional cases we do meet must be taken care of efficiently if we are to maintain our professional prestige.

## "GRAVEL"

I first want to say a few words about the diagnosis and treatment of so-called gravel, which is caused by dirt and infection being forced into a small crack in the wall of the hoof, resulting in an accumulation of pus in the sensitive lamina with severe lameness. Careful observation of the horse as it is being led from the stable often will enable one to diagnose the condition and find the exact location of the trouble. The animal will usually extend the toe in an exaggerated manner so as to bear most of its weight with the back part of the foot. Also, it will tend to toe in or toe out, as

the case may be, to get the weight either on the inside or outside of the foot away from the point of trouble. Many cases that are not so readily figured out can be located at once by the judicious use of a good pair of hoof testers.

Having located the lesion by cleaning and trimming in the bottom of the foot and clinching the diagnosis with a probe, I proceed to take out a section of the wall in the shape of an inverted "V." When I have finished, there is a notch in the wall of the hoof at the bearing surface extending up to an apex directly over the accumulation of pus in the lamina. By treating in this manner, the drainage is downward and forward and on the outside of the hoof instead of under it. It is almost impossible for more dirt to pack into the wound and occlude the drainage, and very seldom is any after treatment needed or advised. If necessary, the animal may be shod and returned to work at once, as the wound is entirely open and above the shoe. Tetanus antitoxin is recommended.

## PUNCTURE WOUNDS

The treatment of puncture wounds may be very simple or extremely serious, depending, of course, upon the nature of the injury. For the simple puncture wound, drainage is the all-essential procedure. If the wound happens to be near the wall, a small portion of the wall may be removed and the trouble treated the same as for "gravel." When the wound is more or less midway between the wall and the frog, the diseased sole is removed and the dressing held in place by means of horseshoe nails. I am never without a supply of these nails, as they can be driven into the wall parallel to the sole and the dressing packed over the wound, and held by the nails. This is a simple dressing for the owner to take care of, since he merely has to bend the nails slightly to remove the old dressing and re-

\*Presented before the Section on Surgery and Obstetrics at the seventy-eighth annual meeting of the AVMA, Indianapolis, Ind., August 11-15, 1941.

(Continued from preceding page)

narian with experience in handling bulls.

5) Requires supervision to make and keep accurate records.

6) Demands that farmers inform themselves about the science of breeding.

7) Motivates unscrupulous persons to overpromote the project for personal gain.

8) Invites destructive criticism if the bulls fail to sire outstanding calves.

place it with a new one. Another type of dressing for these conditions is a piece of leather fashioned the size and shape of the bottom of the foot and held in place with shingle nails driven into the wall from the inside.

In case these penetrating bodies enter deep into the back portion of the foot and the resulting pus burrows up into the hollow of the heel, I never hesitate to enlarge the wound directly from the original tract to the opening in the hollow of the heel. A large seton may then be drawn through the wound and left in place for 48 hours or more to establish thorough drainage. In some of these cases it seems even more practical to open the tract completely out through the back of the foot, removing a complete section of tissue so that drainage is assured until there is time for proper healing and repair.

If the penetrating object has invaded the navicular joint and there is evidence of infection, a radical operation is in order to remove a large portion of the sensitive frog and enough underlying tissue and tendon to insure complete dependent drainage.

Occasionally a nail or other object will strike the os pedis in such a manner as to break off a small part of the thin edge of the bone. In this event enough of the sole of the foot must be removed to allow complete removal of the loose bony piece.

Establishment of perfect drainage from a recent nail puncture is sometimes difficult, due to excessive hemorrhage and sensitiveness of the part. However, I have found actual cautery one of the best methods. In this way the opening can be sufficiently enlarged, hemorrhage is controlled and the risk of infection is eliminated.

#### QUITTOR

Quittor is one of the most annoying conditions of the horse's foot. Medicinal treatment of one kind or another has been used with varying degrees of success or failure, and in my hands it usually has been failure. Once the diagnosis is made, I always advise surgical interference. The horse is confined, preferably on a table, and an open-

ing is made into the affected area above the coronary band. This opening should be large enough to expose all of the affected cartilage and from  $\frac{1}{2}$  to 1 in. wide, depending upon the extent of the enlargement. Then, with a sharp curette all of the necrotic cartilage is removed. If the disease process goes deep, great care must be exercised to prevent damage to the joint, and the curette should always be directed away from the center of the foot. When the infection is not too extensive and all of the necrotic tissue can be removed from the indicated opening without dipping too far below the coronary band, the above operation may suffice. However, if the necrosis extends much below the coronary band, a sizeable opening should be made through the wall of the hoof below the band. A good-size seton is left in the wound for several days to insure drainage for the healing period.

#### LAMINITIS

Another condition that is encountered at times is a case of laminitis that has reached an advanced stage before suitable treatment could be started or even severe cases that do not seem to respond to treatment for several days. The following treatment has been recommended in the literature but, in my opinion, has not been used as frequently as it is indicated. There is, of course, a severe congestion of the sensitive lamina and infiltration of the parts with blood to such an extent that the complete separation of the wall of the hoof and the underlying sensitive structures is almost sure to result unless some radical means is used. This condition can be overcome to a marked degree by cutting a V-shaped groove in the front of the hoof wall, starting the upper parts of the V at the coronary band and making the two grooves start about 3 or 4 in. apart and having them converge at the extreme distal end of the wall. The grooves should be cut clear through the wall down to the sensitive lamina, exposing the congested tissue the full length of the V from top to bottom. This will relieve the pressure and prevent such a



## Chorioepithelioma of the Bitch

WAYNE H. RISER, D.V.M.

*Des Moines, Iowa*

A CASE OF chorioepithelioma in the bitch following pregnancy was reported by the author<sup>1</sup> at an earlier date. It was stated that this condition in man is considered rare and that only one case had been reported (Schlotthauer<sup>2</sup>) in American veterinary literature over a period of 25 years. The writer expressed the opinion that because the condition is rare, it has passed unrecognized a number of times in veterinary practice.

The present subject was a 4-year-old Boston Terrier, female. She had a history of having whelped six live, normal puppies five days previously. Following an unaided normal delivery the bitch continued to bleed through the vagina. It was reported that her general health was good, her appetite was excellent and there was no vomiting or diarrhea. She cared for her young and produced sufficient food for them. Examination revealed her temper-

ature to be normal, but visible mucous membranes were pale and the vaginal flow was odorless and of the consistency of partially clotted blood. The uterus was enlarged and firm on palpation.

Tumor of the placenta was considered as a possible cause and an attempt was made to control the bleeding by the use of ergot derivatives. This procedure failed and surgical removal of the uterus was advised. This was refused until the tenth

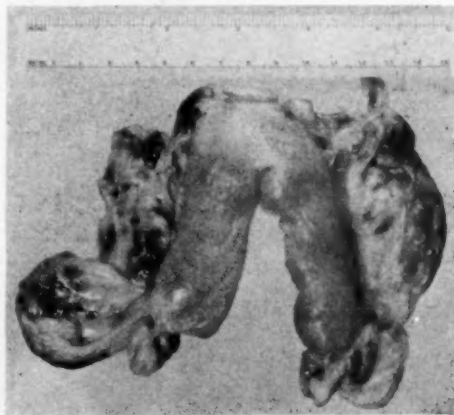


Fig. 1. Uterus removed at operation.

<sup>1</sup>Riser, W. H.: Chorioepithelioma of the uterus of a dog. J.A.V.M.A., xcvi (Feb. 1940), pp. 271-272.

<sup>2</sup>Schlotthauer, C. F.: Primary neoplasms in the genito-urinary system of dogs. J.A.V.M.A., xcv (Aug. 1939), pp. 181-186.

(Continued from preceding page)

permanent deformity that future service may be impossible.

Permanent cracks in the hoof wall sometimes result from injuries to the coronary band, especially wire cuts. These often can be repaired satisfactorily if one will start at the top of the wall and remove about a half-inch strip of the wall on either side of the crack and expose the sensitive lamina clear to the bottom of the wall. Movement of the parts should be prevented by having the foot shod, preferably with a bar shoe. Of course, the coronary band can never be fully repaired, but a strong enough union will be made to maintain the animal in service.

day. The bitch was admitted for operation at this time. The mucous membranes were very pale, she was weak and her gait was slow and unsteady. She had a normal temperature, continued to eat and there was no odor from the vaginal discharge. She was in fair flesh and had supplied sufficient milk for her puppies for the ten-day period.

Blood studies revealed an erythrocyte count of 1,400,000 per cmm. with a few nucleated and reticulated cells. The leucocyte count was 28,700 per cmm. and the differential count was in the normal range. She was given a transfusion of 200 cc. of blood and 150 cc. of saline solution with 5 per cent glucose before the operation. A laparotomy was performed and the uterus was found to be large, distended and firm.

Three distinct, hard enlargements were noted on each horn of the uterus. A complete oöphorohysterectomy was performed. No difficulty was encountered in the operation except that coagulation of blood was very slow and the capillaries had a tendency to ooze. Numerous hemorrhages appeared in the uterine ligaments and omentum as each was handled. Birge<sup>3</sup> reports



Fig. 2. Opened uterus, showing neoplasms at placental attachments.

this to be a characteristic finding in surgery where anoxemia is present, due to lowered erythrocyte count.

Immediately following the operation the patient was given 150 cc. of saline solution with 5 per cent glucose subcutaneously. The following day she was given another transfusion of 200 cc. of blood, and at the same time 200 cc. of saline solution with 5 per cent glucose was given subcutaneously. Daily injections of liver extract were used to stimulate the production of blood cells. The recovery was uneventful and the patient was released on the tenth day. She has remained well for five months and metastasis has not occurred.

The uterus was pale, distended and firm. The horns were 15 cm. in length and 3 cm. in diameter. Three distinct bands 1.5 cm. in width were detected bulging the serosa of the organ (fig. 1). When the uterus was opened, the entire lumen of the horns and body was filled with partially clotted blood. When the blood was removed, the six zones where the placentas were previously attached extended 0.5 cm.

<sup>3</sup>Birge, R: Personal communication.

into the lumen beyond the surface and the endometrium (fig. 2). The zonary areas were all stripped free from any visible fetal placenta and their surfaces were rough, irregular and hemorrhagic, giving an appearance much like granulation tissue. The endometrium at other points was normal in appearance and the cervix was slightly dilated.

Histologic sections showed a disorderly arrangement of syncytial cells, invading the myometrium. Very few pavement-like, Langhans cells were present. These cells had a tendency to ulcerate and necrose at the surface where the placenta had been attached. According to the classification of Smith and Goldman,<sup>4</sup> this neoplasm is a chorion-epithelioma of syncytial type.

Hertig and Edmonds<sup>5</sup> classified these types of neoplasms. According to their classification this tumor resembles the syncytial type, but it differs somewhat because it is not cystic. It is, however, essentially composed of visibly avascular connective tissues surrounded by chorionic epithelium which varies from a normal or thin atrophic layer of Langhans and syncytial cells that are irregularly thickened to hyperplastic layers of compound masses of syncytiotrophoblastic and cytotrophoblastic cells.

No one has explained why these apparently normal cells suddenly begin to grow wildly and invade surrounding tissue and why this does not happen more often.

To view an infection from the standpoint of the naturalist is an achievement of recent years.—K. F. Meyer.

The physiologists of the nineteenth century called the blood plasma "liquor sanguinis." They did not confuse the term with "serum," which is not applicable to circulating blood.

<sup>4</sup>Smith, E. C., and Goldman, D. W.: Chorion-epithelioma. *J. So. Med.*, xxxiv (May 1941), pp. 486-493.

<sup>5</sup>Hertig, A. T., and Edmonds, H. W.: Genesis of hydatidiform mole. *Arch. Path.*, xxx (July 1940), p. 260.

## Diaphragmatic Hernia in the Dog with Complete Atelectasis of One Lung\*

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DIAPHRAGMATIC HERNIA, congenital and traumatic, is not rare in dogs. We are reporting the following case because it has some interesting aspects which seem to be worthy of record.

In August 1941, the subject was received from the city dog pound. It was a male mongrel, part Chow and part Police, weighing 32 lbs. and about 3 years of age. The animal was limping on the right hind leg. He was friendly, but seemed to have pain when touched. The appetite was poor and he was in only a fair nutritional state.

\*From the Department of Gastro-Intestinal Research, Michael Reese Hospital. This study was aided by a grant from the Gusta M. Rothschild fund.

No vomiting was observed. On examination the right knee joint was found to be loose and crepitant. The four right lower ribs were bulging out and seemed to have been broken and healed in an abnormal position; thick callus was felt over their lateral aspects. No respiratory embarrassment was evident.

The animal was anesthetized by intravenous injection of sodium pentobarbital and the abdomen opened. The abdominal cavity was found to contain about 500 cc. of a light-red, serous fluid. The abdominal organs appeared normal except for the left lateral lobe of the liver, which was connected to the left diaphragm by a few thin



Fig. 1. Exposed diaphragmatic hernia. The dog is lying on its back. The liver has been retracted, except for its left lateral lobe, which is seen protruding through the tear in the left diaphragm.



adhesions. After these had been severed, bloody fluid from the thoracic cavity flowed through a hole in the diaphragm which the lobe of the liver had occluded, and the dog died from pneumothorax. The defect in the diaphragm was  $2\frac{1}{2}$  in. long, oval shaped, and extended diagonally from the tendinous dome of the diaphragm to the left side. In the vertical direction the defect was about in the middle of the left diaphragm, extending over about four fifths of it. The edges were smooth and fibrous. Nearly the entire left lateral lobe of the liver had been above the diaphragm in the thoracic cavity and had covered and apparently occluded the opening (fig. 1). The part of the liver which had been in the chest was swollen, dark reddish brown, had rounded edges, and the bile ducts were stretched. The stomach was rather low in the abdomen and the gastrohepatic ligament was elongated and taut, and apparently had been stretched considerably. Adhesions other than the few between the left lateral lobe of the liver and the diaphragm were not found in the cavity. The spleen was small and contracted. The serosa of the stomach and intestines was normal. Both kidneys and adrenals were normal. The serosa of the liver was smooth and the liver was dark brown. The mucosa of the stomach was normal; that of the duodenum showed small patches of hemorrhage; the mucosa of the jejunum and ileum showed large and small similar areas. The colon was normal. Large lymph nodes in the cecal mesentery presented no unusual finding. When the chest was opened, the left lung was found completely atelectatic. Bloody serous fluid was present in both cavities. The right lung showed patches of early bronchopneumonia. The heart had apparently stopped in diastole and was dilated and flabby. The veins were engorged.

#### DISCUSSION

The animal seemed to have been injured severely on his right side several months previous to our observations, with fracture

of the right knee joint and of the four right lower ribs. The defect in the diaphragm seemed to be traumatic, in view of the adhesions between the liver and diaphragm, the presence of an exudate in the chest and abdomen, and the relatively recent fractures of the leg and ribs. The edges of the diaphragmatic defect were smooth and fibrotic, but it seems to be the consensus of most authors writing on this subject that this may well be due to normal healing processes following trauma, and need not indicate a congenital origin of the defect.<sup>1, 2</sup>

What impressed us particularly was the lack of respiratory embarrassment, although the left lung was completely atelectatic, the right lung had a beginning bronchopneumonia, and both pleural cavities and the abdominal cavity contained considerable amounts of fluid. The atelectasis of the left lung may have been due to compression by exudate, but it may as well have been due to a small tear on the surface of the lung following the trauma and the subsequent escape of air into the left thoracic cavity. The surface of the left lung was smooth and did not show any adhesions, but we are told by pathologists that a small rent in the visceral pleura, as assumed above, may heal without macroscopic evidence.

It has been claimed by various authors that congenital diaphragmatic hernias in the dog usually are located on the right side, while traumatic hernias usually are found on the left side.<sup>2</sup> Our case would agree with this generalization, but a review of the literature reveals a number of right diaphragmatic hernias following trauma.<sup>2-5</sup>

<sup>1</sup>Bystrow, A. P.: *Hernia Diaphragmatica beim Hunde*. Anatomisch. Anzeiger, lxx (1930), p. 192.

<sup>2</sup>Krause, C.: Über sogenannte Zwerchfellhernien bei Haustieren nebst Beitrag zur Nierengenesie des Pferdes. Arch. f. Tierheilk., lxii (1931), p. 567.

<sup>3</sup>Unglas, M.: *Hernie diaphragmatique du chien*. Rec. Méd. Vét., ci (1925), p. 167.

<sup>4</sup>Turla, F. F., and Yutuc, L. M.: *Diaphragmatic hernia—a cause of ascites in a dog*. Vet. Rec., vii (1927), p. 193.

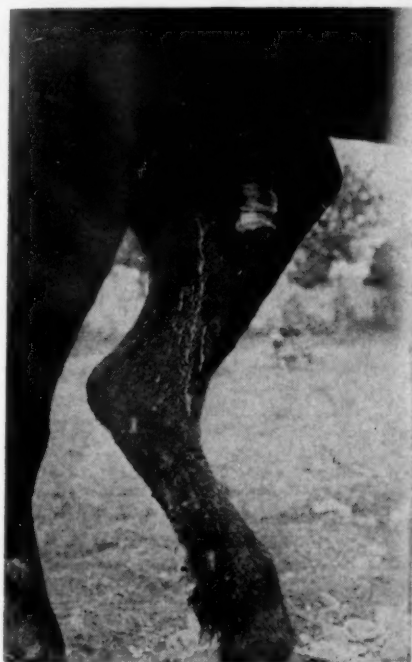
<sup>5</sup>Brion, M. A.: *Hernie diaphragmatique chez le chien*. Rec. Méd. Vét., cvii (1931), p. 78.

The French literature seems to be particularly rich in observations on diaphragmatic hernias in the dog, and apparently the first case was reported in 1703 by Geoffroy De Saint-Hilaire.<sup>1</sup>

The manifestations of pain when the animal was handled may have been due partly to the fractured knee joint. The pain in our animal was certainly not due only to the latter cause, because it was in evidence when he was touched at other regions. It may have been due, however,

to a state of anxiety which found expression in the general appearance of the dog. We would like to stress that such a severe condition as found in our case did not lead to respiratory embarrassment, a fact which misled us in our preoperative diagnosis. We believe that an x-ray picture might have revealed the lesion by showing atelectasis of the left lung and the protrusion of the liver into the thoracic cavity, and we feel that in cases of traumatic injury to the body of dogs a barium meal and x-ray should be the rule.

## Four Plagues of War



Left: Infectious lymphangitis with prolapse of the penis. Upper right: Generalized mange. Lower right: Mustard gas burn. (These pictures were taken in France during World War I.)

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# CLINICAL DATA

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Daily exercise (walking to feed) and 2 to 4 oz. of blackstrap molasses in each day's ration per ewe will help a lot in avoiding so-called lambing paralysis or pregnancy disease.—*From the veterinary column of Successful Farming.*

Although calfhood vaccination gives greater returns than any other measure in the control of Bang's abortions, lack of abortions is not an index to the disease status of the herd.—*Asa Winters in The Cornell Veterinarian, Oct. 1941, p. 355.*

Blood studies are important in hog cholera, canine distemper, ancylostomiasis of dogs, strongylosis of horses, verminous gastritis of ruminants, and feline distemper. Not to know the *soi disant* blood picture in handling these ailments is not to know all about the therapeutic problem involved.

That the toxicity of phenothiazine and certain related compounds varies was shown in a study of the action of these drugs on screwworm larvae made by Bushland of the USDA. It was shown that any alteration in the molecule of these compounds may influence their toxicity.—*Abst., E. S. R., Jan. 1941, p. 84.*

The medicinal dose of sulfanilylguanidine for swine appears to be about 15 gr. per pound of body weight, according to toxicity determinations made by Cameron and McOmie (*Cornell Veterinarian, Oct. 1941*) of the University of California. Ten times that amount given twice daily for five days was toxic. Large single doses were non-toxic.

In the administration of thiamin hydrochloride for therapeutic purposes in dogs

of average size, dissolve 300 mg. in 30 cc. of water and give an initial dose (*per os*) of one teaspoonful of the solution. Thereafter, give 1 to 2 minims on the food daily. The injectable form is advisable where, owing to gastroenteritis, absorption is hindered. The normal B<sub>1</sub> requirement for dogs is about 100 micrograms per pound of food.—*From Canadian Journal of Comparative Medicine, Oct. 1941.*

The effect of sulfanilamide and derivatives on red blood cells is anemia when these cells contain inner bodies. Experiments on mice show that sulfanilamide exerted stronger internal reaction than sulfapyridine. Others of these preparations did not produce anemia. Oxidization products seem to elicit toxic reactions. The inner body reactions produced by "sulfa" drugs help to decide whether their use will be complicated by hemolytic anemia.—*Abstract, J.A.M.A., Nov. 22, 1941, p. 1814.*

The role of ticks as carriers of encephalitis virus (human) was established in recent years in the forest regions of Siberia. The brain lesions are similar to those of St. Louis and Japanese encephalitis. The tick incriminated is the *Ixodea perculatus*. Its vector rôle was demonstrated in the regions where the disease was endemic. The human and animal population (horses, cattle, etc.) were found to have neutralizing antibodies against the encephalitis virus.—*Acta Medica, USSR, Moscow, 1940. Abstract, J.A.M.A., Nov. 22, 1941, p. 1815.*

Obstacles in preparing a pure johnin arising from difficulties encountered in culturing the specific agent have been overcome by laboratory methods developed at the Animal Disease Research Institute at



Hull, Que. The pure johnin, prepared on a synthetic medium free from objectionable bacterial products, is comparable to tuberculin produced by the method of Seibert (1934), and the method of eradicating the disease from infected herds is comparable to that employed for tuberculosis.—*From Canadian Journal of Comparative Medicine, Oct. 1941.*

### Vitamin A Deficiency in Cattle

Vitamin A deficiency in fattening cattle is manifested by night blindness, opacity and ulceration of the cornea, edema of the limbs and other parts of the body, convulsions, nasal discharge, inelasticity of the skin, failure to reproduce, loss of weight and appetite, panting and drooling in hot weather. The feeding of carotene-containing green feeds, cod liver oil or crystalline carotene in maize oil is readily curative.—*Hubert Schmidt in American Journal of Veterinary Research, Oct. 1941.*

### Silage for Chickens

Silage made from green cow peas, alfalfa or clover, sour skimmed milk or powdered buttermilk, in a 50-gallon barrel with or without black-strap molasses, is an excellent feed for chickens, says a report from the University of Tennessee. Compared with young chickens fed on mash alone, the gains were markedly in favor of the silage, and laying was stepped up 30.5 per cent. The gains where skimmed milk was mixed with the mash were about the same, but the silage was much cheaper.

### The Demianovitch Treatment of Mange in Horses

The preparation used is a 60 per cent solution of sodium hyposulfite and 10 per cent of commercial hydrochloric acid. The mixture is scrubbed into the coat with a body brush every third day. Three such treatments are given. In extremely cold weather but one half of the body is treated at the time, since it requires considerable time for the surface to dry. Otherwise

there is no ill effect from this drastic treatment. The treatment is efficient.

In addition to the interaction of the two chemicals on the skin, the moisture and the oxygen of the air produce determinable HSO compounds destructive to mange mites.—*From an abstract in The Veterinary Record, Oct. 18, 1941.*

### Some Diseases of Uncommon Animals

The annual report of the veterinary service of Los Angeles county, California, contains interesting facts about diseases of animals not commonly included in veterinary literature. The animals and their ailments diagnosed during the fiscal year 1940-1941 were:

#### RABBITS\*

Mucoid enteritis	Coccidiosis
Snuffles	"Head down"
Vent disease	Ringworm
Myxomatosis	Pneumonia
Pasteurellosis	Nephritis
Hemorrhage	Toxemia
Peritonitis	Enteritis
Paralysis	Bronchitis
Cyatitis	Tumor
Paratyphoid	Volvulus
Septicemia	Mastitis
Hepatitis	Ruptured liver
Meningitis	Indigestion
Obstipation	Gastritis
Diarrhea	Trauma
Metritis	Abscess
Intestinal catarrh	Parasites

#### MINKS

Pneumonia	Toxemia
Malnutrition	Mucoid enteritis
Indigestion	Coccidiosis
	Ptomaine poisoning

#### FOXES

Pneumonia	Paratyphoid
Toxemia	Coccidiosis
Gastritis	Parasites
	Trauma

#### GUINEA PIGS

Pneumonia	Gastritis
Anthrax	Septicemia
Toxemia	Peritonitis
Nephritis	Orchitis

#### CHINCHILLAS

Trauma	Stomach obstruction
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Fox distemper and fox encephalitis, two infectious diseases said to be quite preva-

\*Rabbit raising is a million dollar industry in Los Angeles county.

lent among the fur farms of the north-central states, are not mentioned, although L. M. Hurt in his annual report to the board of supervisors of Los Angeles county advises fox breeders to give their foxes "a one-way ticket" when they leave their pens for the show ring.

### St. Louis and Western Equine Encephalomyelitis Virus Isolated from Mosquitoes\*

Workers at the University of California and The State College of Washington have isolated from mosquitoes (*Culex tarsalis*) the virus of both the St. Louis and equine strains of encephalitis virus. Though the mosquito has been repeatedly incriminated as one of the infecting agents, the virus was never before isolated directly from insects. The specimens were collected from the Yakima Valley in Washington by means of traps, sweepings and hand collection, and shipped in sealed, hard-glass vials to the San Francisco laboratory, where the arthropods were prepared for the investigation.

The group consisted of 7,619 mosquitoes, 1,458 flies and 428 other biting insects. St. Louis virus was isolated from a pool of 66 mosquitoes and the western equine virus from a pool of 125. Each was identified by properly controlled animal inoculations (mice, rabbits, guinea pigs).

### Hog-Cholera Virus in Sheep and Cattle

In the study of virus diseases there is early and also recent work to be credited. In the 1870s, H. J. Detmers, working for the federal government, James Law of Cornell University and F. W. Prentice of Illinois Industrial University, now the University of Illinois, were working coöperatively in attempting to prove a relationship between hog cholera (called swine plague) and contagious pleuropneumonia of cattle, two diseases that were causing a great

deal of anxiety in animal production at that time.

James Law is on record as having transmitted hog cholera to sheep, and Detmers, using swine-plague material, thought he had produced the disease in a mild form in cattle.\* Zichis,† 60 years later, passed noncontaminated hog-cholera virus through sheep and reproduced the disease in hogs.

### Active Immunity to Tetanus

Active immunity to tetanus has long since passed the research stage. Man and animals can be sheltered from that disease with no more trouble than taking a hypodermic injection. However, the use of the immunizing toxoid is strangely neglected in this country both in human and veterinary medicine. According to *Public Health Reports*, there were 930 human cases of tetanus in the States Registration Area and the doses of tetanus antitoxin used annually in treating tetanogenic wounds in man and animals ran into hundreds of thousands. In short, there is no longer any reason to take the chances of contracting tetanus, whether it be farmers, industrial workers, children or horses—all of whom are constantly exposed to an infection almost as deadly and much more common, in man and horses, than rabies.

Tetanus immunization is practiced on a large scale in the European armies. Except in the regrettable French army, where all horses were thus immunized, we have no information as to that practice (for animals) in the present armies in the field. Italian, Russian and Canadian soldiers are made tetanus immune. In the British forces, although optional with the soldier, a large proportion consent. The situation in our field is simply this: Horses of value should be permanently immunized against tetanus because the cost is trivial and the results excellent.

\*Hammon, W. McD., Reeves, W. C., Brookman, B., Izumi, E. M., and Gjullin, C. M.: *Sci.*, xciv (Oct. 3, 1941), pp. 324-326.

\*Contagious diseases of swine and other domestic animals. USDA, Special Report, No. 22 (1880).

†Zichis, J.: Studies on hog-cholera virus. *J.A.V.M.A.*, xciv (Sept. 1939), pp. 272-277.

# Sulfapyridine Therapy in Local Infections\*

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REPORTS PUBLISHED recently in British medical journals<sup>1-3</sup> indicate that the sulfonamide drugs are of great value in cases of war wounds among the soldiers of the British expeditionary forces. In fact, the results obtained, in comparison with World War I, are almost miraculous. Many legs and arms which previously would have required amputation are now being saved.

Such reports were appearing during the time the author was becoming interested in sulfapyridine therapy in animals. This drug was reported to possess a wider range of therapeutic usage than sulfanilamide. Although the mechanism of the action of sulfonamide drugs is not clearly understood, according to Long and Bliss<sup>4</sup> concentration has a definite influence on their effectiveness. For example, 10 mg. per cent may be bacteriostatic, whereas 10 to 40 times this concentration was reported to be bactericidal. The same authors reported that various organisms causing infection in the urinary tract require different concentrations for successful action. For example, 100 mg. per cent was effective against *Staphylococcus albus*, whereas over 300 mg. per cent was required in *Proteus* infection. These observations led the writer to consider the possibility that outstanding results could be obtained if these drugs could be used locally in concentrations that would exert their full activity against the microorganisms, and yet avoid the toxic effects<sup>5</sup> which can and sometimes do occur

from oral administration. There are many places where the drug might be used locally, and experiments already had been started when the results in the British expeditionary forces first began to arrive.

A review of the literature revealed that Jensen, Johnsrud and Nelson<sup>6</sup> used 5 to 15 Gm. of sulfanilamide in 39 compound fractures and two compound dislocations. Débridement and hemostasia were employed before adding the sulfanilamide, and the wound was sutured without tension. In no instance did a primary wound infection occur, whereas in 94 open fractures treated by similar methods, except for the use of sulfanilamide, infection occurred in 27 per cent of the cases, including seven cases of gas gangrene and five amputations.

The question as to what effect the high concentration one of these drugs may have upon the healing of the wound might be raised. Key and Burford<sup>7</sup> studied this in rabbits. They found that implanting sulfanilamide in a fracture of one leg had no retarding effect in comparison with a similar fracture of the opposite leg. Maintaining therapeutic concentrations of sulfanilamide in the blood of dogs for 42 days also did not seriously interfere with the union of fractures or healing of soft tissues in a series of six dogs, in comparison with a similar number of controls. These authors reported that most compound fractures will stay closed without infection if they are sutured and immobilized after débridement and sprinkling with sulfanilamide crystals. They did not consider it necessary to use sulfonamide locally in clean operative wounds, but recommended its use where

\*From the Baltimore City College.

<sup>1</sup>Buttle, G. A. H.: Chemotherapy of infected wounds. *Lancet*, I (May 11, 1940), pp. 890-893.

<sup>2</sup>Buchanan, J. W.: Local treatment with sulfonamides. *Brit. Med. J.*, II (Aug. 3, 1940), p. 167.

<sup>3</sup>Chemotherapy for war wounds. Edit., *Brit. Med. J.*, II (Nov. 9, 1940), pp. 640-645.

<sup>4</sup>Long, P. H., and Bliss, E. A.: The Clinical and Experimental Use of Sulfanilamide, Sulfapyridine and Allied Compounds. (The Macmillan Co., New York, 1939.)

<sup>5</sup>Morris, M. L.: Preliminary observations on sulfanilamide in canine practice. *No. Am. Vet.*, XVIII (Dec. 1937), pp. 54-55.

<sup>6</sup>Jensen, N. K., Johnsrud, L. W., and Nelson, M. C.: The local implantation of sulfanilamide in compound fractures. A preliminary report. *Surg.*, VI (July 1939), pp. 1-12.

<sup>7</sup>Key, J. A., and Burford, T. H.: The local implantation of sulfanilamide in compound fractures; its effect on healing. *So. Med. J.*, XXXIII (May 1940), pp. 449-455.



there is reason to fear the development of infection.

#### METHOD OF APPLICATION

The method of application chosen for this clinical study was adopted on the basis of using sulfapyridine topically, like an antiseptic dusting powder. Wounds and fistulas were cleansed as usual and powdered sulfapyridine was worked into the open abrasions.

#### REPORT OF CASES

1) A fistula of the withers in a Shetland pony was opened, curetted, drained, cleansed with an oxidizing antiseptic, and some powdered sulfapyridine was worked directly into the wound and in fistulous tracts down to the ligamentum nuchae. The drainage gauze was dusted with the drug. Treatment was carried out every other day for a week. The case appears to have responded to treatment.

2) A local abscess occurring on the mammary gland of a Holstein-Friesian cow was opened, drained and packed with dry sulfapyridine powder. Uneventful recovery followed, without recurrence of sepsis or abscess formation. The milk secretion was normal after the infection had subsided. There was no active leucocytosis in milk samples examined with methylene blue stains and streptococci were not present in large numbers.

3) A horse went down with a suppurative tendovaginitis following a puncture wound of the fetlock of the left hind leg. With cotton plug applicators sulfapyridine was forced into the opening and as far into the tendon sheath as possible. No further antiseptic treatment was used. Recovery was prompt.

4) Sulfapyridine made a good dry dressing for saddle and harness galls and appeared to prevent suppurative sequels.

5) Beagle, old; leg caught in a revolving bicycle wheel, resulting in a compound-comminuted fracture of the humerus and radius, leaving an ugly lacerated wound infiltrated with hair, oil and dirt. As infection appeared the prognosis was certain. The fracture was reduced and immobilized, and the wound was packed with sulfapyridine and sutured. There was no wound fever, pus formation or sepsis. Healing occurred by primary intention. Recovery, without infection, followed, except for a hyperplastic osteitis of the fractured region and a slight, permanent, mechanical deformity.

6) Old cat, submaxillary abscess with hot, painful, diffuse swelling; temperature 102 F.; general malaise. Sulfapyridine was dusted into

the open abscess after lancing. Healing was prompt.

7) Mongrel Collie, age 5 years; extensive external leg injuries from an auto accident. Thirty-two interrupted sutures were needed. The open wound was dusted freely with sulfapyridine and it was used as the after treatment. Aseptic healing occurred within ten days.

8) Registered Cocker Spaniel, age 5 years; abscess of the mammary glands, temperature 103.2 F. Treatment included the external and internal use of sulfapyridine: 5 Gm. doses four times a day for two days. The case was asymptomatic in five days.

9) Persian cat, age 5 years; compound distal fracture of the tibia and fibula with a sharp spicula of the fibula protruding. Sulfapyridine was used topically after reduction to prevent infection. The case terminated satisfactorily, without post-operative infection.

10) Cocker Spaniel, age 5 years; extensive second-degree burns on back and side from scalding hot soup; hair and superficial epidermis denuded. Red, hyperemic, moist, painful patches were exposed to infection. The owner had used salad oil as a first-aid measure. The treatment employed was copious dusting with sulfapyridine. Normal healing took place without suppuration or wound fever.

11) Old Persian cat; sustained a compound fracture of the mandible and extensive nose and oral injury in a dog fight; teeth were knocked out. The cat already showed evidence of alveolar periostitis. The fractured parts were wired together and sulfapyridine was dusted into the abrasions. Recovery followed without infection, but the cat had a permanent deformity around the mouth and nose.

12) Cat shot by an arrow, two days prior to treatment. There was a penetrating wound extending through the cheek into the mouth. Two teeth were knocked out and the jaw was splintered. Infection already had set in. The wound and tooth sockets were curetted and packed with sulfapyridine, after which healing took place without further sepsis or infection.

#### DISCUSSION

Although these results do not include a large number of each type, they do show that topical sulfapyridine therapy is promising in both large and small animal practice. The drug was used prophylactically in four cases and therapeutically in the remaining ones. Where used prophylactically, there were reasons to expect that the wounds would become infected and the usual troubles would follow.

The four cases of abscesses and the case each of fistula and tendovaginitis are

interesting because the treatment was successful after infection already had become established. Long and Bliss<sup>4</sup> report that the oral use of the sulfonamides is far from being successful in cases of abscesses, unless drainage is employed simultaneously. The ease with which local applications can be employed and the fine results obtained suggest that they should be widely used. Drainage must be established irrespective of the method of using sulfapyridine. It is a simple procedure to use the powder in packing or dressing surgical wounds.

In only one case (No. 8), where the animal was suffering from an extensive involvement of the mammary glands, was it found necessary to employ internal as well as local treatment.

#### SUMMARY

The results obtained in twelve cases demonstrate that the local use of sulfapyridine is promising in veterinary practice. It was successfully used prophylactically in compound fractures, wounds and burns, and gave good results in abscesses.

### Poultry in Scientific Research and Veterinary Practice

Because the fowls of the *basse-cour* (= chickens) are quick-growing machines, exuberant sources of human food and the generators of a vast industry, they furnish a fertile soil for the study of nutrition. From ovum to adult is but a matter of days, and the production of an unparalleled poundage of food a mere matter of months. With chickens as the "guinea pigs" there is no long wait. Their biomechanism is geared up and wide open for the gaze of the investigator.

As a consequence of this favorable combination, science and invention in hatching, brooding, housing, feeding and disease control have brought out a splurge of printed material in the form of bulletins, pamphlets and bound volumes which has to be winnowed. There is chaff to be separated from the grain, chickens having become such a prolific source for commercial exploitation. Poultry science has been an inviting field of investigation and its achieve-

ments are not discounted; but on the nutritional side, it is truly a file of many exaggerations. As Ewing points out in a book reviewed in this issue (*vide*, page 85), experts and laymen have been confused by contradictions.

Through a maze of poultry literature the poultryman is taught to trust almost everything to nutrition. Disease is artfully dodged in most of the literature he receives, regardless of the fact that it is the main menace to his enterprise. The consequence is that the veterinarian is not the community's source of instruction on the hygienic factors involved in poultry production. Salesmanship couched in the language of science by capable scientists has the floor. The veterinarian is called upon to speak when chicks or chickens are perishing *en masse*—when it's too late to do much good. In stepping into the field of poultry practice there is this obstacle to surmount. As things are today, the practitioner's best opening is coöperation with the experts in the field of poultry nutrition, thus aiding the poultry industry, the honest feed manufacturer and himself.

### Rhododendron Poisoning\*

Eight yearling cattle and an aged cow, seeking shelter from a snow storm in a patch of rhododendron bushes, fed upon the leaves of that plant. Although all sickened, none died.

The symptoms were salivation, vomiting, straining to defecate, bloating, constipation, shivering, incoördination of gait, staggering, and difficulty in rising. The duration of the grave symptoms was three to six days. One was down in a semicomatose state for six days. The treatment consisted of evacuating the bowels with lentin and drenches of an anodyne in small doses of linseed oil.

Push hog and dairy production. "There's a green light ahead," is the way *Successful Farming* tells it.

\*Masheter, J. W. H.: Rhododendron poisoning in cattle. *Vet. J.*, xcvii (July 1941), pp. 223-225.

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# EDITORIAL

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## The New Argentine Treaty

AGRICULTURALLY, the Argentine and the United States are almost alike. They have the same crops and the same kinds of livestock, and they exploit the same foreign markets.

Industrially, they differ. In the United States, factories of extraordinary capacity and variety grew up alongside a vast livestock industry well provided with natural resources and well managed. The Argentine remained mainly agricultural.

Since both of these countries have had the ambitions of the adolescent, their respective statesmen found it hard to bring about mutually helpful trade agreements. The first pact was brought about by Secretary of State Daniel Webster in 1853. Efforts in that direction made in 1869, 1883 and 1899 were rejected. The treaty of '99, representing many years of attempted reconciliation, was not ratified by the U. S. Senate. Protective tariff was the issue of that day and the thought of the Western Hemisphere as a political unit was still immature. The Louisiana Purchase (1804) of Thomas Jefferson was the child of Napoleonic ambition. The Monroe Doctrine (1823), imago of the unity now sought, was never popular south of the Rio Grande. It always was rated as unwelcome paternity. The army of the 1840s brought in the Southwest and California. Alaska—"Seward's Folly" of 1867—was an example of Yankee trading: 600,000 square miles for a bit of small change. The Spanish-American war (1898) was denounced in South America as willful aggression. Puerto Rico and the Philippines were added to the "empire" by Teddy Roosevelt. World War I yielded the Virgin Islands, *ex necessitate rei*, and World War II a chain of defense stations from Greenland to Trinidad. Ob-

jective: Western Hemisphere unity of independent democracies foreseen only by statesmen who took human nature in all nations at par value.

The Argentine treaty of 1941 is but another link in this chain of events. "Good neighbor policy" is just a name for something else. When America was discovered, explored, settled, tilled and mined and became the very antithesis of the social order of the Old World, the coming of World War II was inevitable. Wealth and power and luxury and freedom are a combination to envy and to covet—a combination to defend against the *fureur* of lust. To understand the issue of the hour one must know its genesis.

For one thing, Western Hemisphere unity was hindered by language. We "doubled" in German and French and paid no attention to Spanish and Portuguese, and thus kept ourselves aloof of our neighbors, who in turn had no patience with English. The unity was in continuity of land, not of thought or of material interest.

### THE DOMESTIC ANIMAL SITUATION

Argentina, Brazil and the United States are three great cattle-breeding countries. Production far exceeds native consumption. The outlet for the surplus is Europe, now blockaded against the meat imports these countries are geared up to provide. Herein lies the interest of the veterinary service in the Latin-American trade pacts now hotly debated. Of the three big nations of the Americas, the United States is the most fortunate. Its manufactures overwhelm the balance of trade. When the new treaty was signed, the Associated Press declared that the admission of some beef, wool and hides from Argentina is a matter



of minor importance in comparison with the "psychological effect of the agreement on Latin-American relations." As she is proud of her commanding position in Latin America, it was a sacrifice to buy from our factories because Germany and England took her farm products and we did not.

Commenting on the new trade pact, *The Cattleman*, spokesman for the livestock industry of the Southwest, points out magnanimously that the closing of markets to her (Argentina's) agriculture and to the sources of her imports (manufactured goods) was the important factor in bringing about the agreement, the benefits of which can not be computed owing to the present conditions of international trade.

The *Dallas News* says: "To claim that farmers and other producers of either country will suffer from the treaty's operation would be to cloud the issue with groundless fear. Political attacks against ratification of the treaty are likely to be made in both countries, but these can have little economic basis."

In Corn Belt newspapers one reads that if unity in furtherance of a Western Hemisphere union against Hitlerism is necessary to national defense, well and good, but these organs still look askance at the duty-free admission of 84 farm products into the United States. Exports of farm products from the country in 1940-1941 were the smallest in 69 years.

As a palliative remedy, the Texas and Southwestern Cattle Raisers Association (*The Cattleman*, Nov. 1941) suggests expansion of the program of popularizing beef that is being carried out by the National Live Stock and Meat Board, which has gone forward to make the public meat conscious and thus increase the use of meat in the American dietary. This society goes on to emphasize the extent to which the meat-packing plants have benefited the livestock industry in developing meat consumption and scores of chemical and pharmaceutical by-products beneficial to mankind as well as to the cattle raiser.

*Dairy Digest* (Oct. 1941) speaks of Argentina building up dollar credits by ex-

porting European types of cheese to the United States in exchange for dairy equipment.

*The Australian Veterinary Journal* quotes Prime Minister Hon. A. W. Fadden as stressing the significance of the "food army" in deciding upon inducting veterinarians into the veterinary service.

The conclusion to be drawn from a survey of the situation at the present time (Nov. 1941) is that, added to its appropriations for the defense of Britain, Russia and China, Americans are justified in regretting implications of unfair play. Mass production in farm and factory is our keystone. To guard these is not only a birthright, but also good sportsmanship and square shooting.

What has this to do with veterinary medicine? The disease question is nowhere mentioned in the pact. The answer is that no group is more vulnerable to social oscillations than we and, certainly, none will watch the effects of this pact with greater interest than the veterinary profession on the line of duty.

If the Argentine trade pact of 1941 leads to animal-disease-control measures throughout the Western Hemisphere comparable with those of the United States, it will be a blessing indeed, for, sooner or later, all mankind from the children up will have discovered that human welfare and animal health run parallel. It may be some time to come when all men will venerate veterinary science as the backbone of this civilization, but that day is sure to come. It now seems in the offing. The dependence of nations on healthy domestic animals is being debated in the Parliament of Britain and in our Congress. It is less than two centuries ago when human welfare began to soar to its present level. The flight began with the starting of veterinary services—the services required for the multiplying of populations and their security.

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Buy Defense Saving Bonds. You live in the only country where "poor" folks have radios, telephones and automobiles.

## Marketing Farm Crops at the Abattoir

THE RAISING OF farm crops without animals through which to market them is not apt to remain a permanently successful type of agriculture. Whether the crop is corn, cotton, wheat, coffee or oranges, the farmer or country concerned is certain, sooner or later, to run into periods of despair. Successful farming on the whole lies in animal husbandry—in marketing crops through food-producing animals: cattle, swine, sheep, poultry. In all times nations have suffered and perished not from declining crops, but from diminished animal holdings—diminished by infectious diseases, for example.

Grain farming is the refuge of agriculture where animal production is not profitable for ecologic or pathologic reasons. Small grains, however abundant, can be more detrimental than useful to agriculture since surplus, economically considered, is the counterpart of crop failure. We are, perhaps, too near the buying and storing of farm crops by the governments of Brazil, Argentina and the United States to compare the reason for these procurements with the events which led, let us say, to the decline of Egypt, Carthage and Rome, where animal plagues harassed farmers and removed the main outlet for the products of their land and their labor.

In successful farming lies man's main hope; in its mismanagement lies his downfall. Yet, strangely, right up to this moment of world's history, this fundamental fact remains unweighed by our general population. There exists but a vague notion that domestic animals fed on the crops of the farms are a source of sustenance. The undeniable fact that without them, in abundance, the American nation would quickly deteriorate is hardly thought of among the sages of this hour. Mining, banking, manufacture, transportation, communication make the headlines, animal production the subtitles. Feeding animals to supply food is benevolently tolerated, but not upheld for what it is worth, in the sphere of human effort.

When Louis XV directed his secretary of state to establish a system of animal-disease control (veterinary colleges and services), his decree pointed to the flourishing civilizations of the ancient husbandmen as the reason for turning more attention to the health of farm animals. As veterinarians are wont to emphasize, the wealth of our country and the comfort of its people developed concurrently in recent decades with an animal industry governed by the doctrines of veterinary science. The foresight of a few implanted a veterinary service into the American scheme of government and gave us the abundant granary now drawn upon to supplement the deficiencies of trans-Atlantic people.

### FARMING AND ANIMALS

Countries producing animals from small grains and roughage raised on the farms become disease-conscious. The grain-bent countries are less particular. Where single crops are the kings, epizootics never make the headlines. But where in addition to fighting weeds and plant parasites farmers also must fight animal disease to save their crops, veterinary medicine is a major part of farm operation. Veterinary education and services were founded on that account. It does not pay to feed crops that vanish in dead or unhealthy animals. The Argentine and the United States furnish the proving ground for that contention. Corn in the former compared to cotton in the latter may be invoked. The corn of Argentina is what its farmers call their cash crop. Its bulk is not fed to livestock. Like our cotton, it goes to the market for cash, where a market can be found. Cattle and sheep are finished on pasture, not in the feedlot, and as in our South, the land is farmed by tenants who take a share as their pay.

Estates of 40,000 acres or more apportioned among 50 or more farmers are not exceptional in the Argentine. With trans-Atlantic markets cut off, the government has been buying and storing corn in the

age-old attempt to keep farmers on the job—to furnish the general population with food instead of watching them seek better occupations in town while standards of living decline. The irony of hunger in the face of abundance is not so strange. It is the unavoidable result of one-crop farming.

Whether the crop is cattle or swine or corn or cotton, the consequence is the same. No one will work for long at an occupation that does not pay, and it does not pay to raise crops at the price of factory fuel as is being done with corn in the Argentine.

American farmers have burned corn in the cookstove and heater. The remedy seems to be regulated, diversified farming, which means raising enough feed for enough livestock and marketing the crops mainly at the abattoir. Transforming plant to animal protein is the sovereign objective of agriculture. But as this reformation is gradually brought about, as it is certain to be if intelligent action takes command of the situation, additional health work among animals will be needed, that is to say, more of the kind of policing that only a well-disciplined and sufficient veterinary service can provide. It is not mere boasting to say that the espousal of farmer and meat packer with a competent disease-fighting service keeping pace is responsible for our abundance, nor to emphasize that maintaining the *status quo* the trio (farmer-packer-veterinarian) represents is the underlying obligation of the veterinary profession as seen through the eyes of the AVMA.

## Evidence to Invoke in Behalf of Veterinarians

1  
WHEN ADMISSION TO a profession is fixed by law, the membership is expected to abide by the standards set down in the statutes. There are scientific knowledge, practice methods and personal conduct to be regulated. To accomplish those ends, collective bargaining is required.

## II

The utopia of veterinary medicine is public welfare, not personal advantage. It lives exclusively from disease and, yet, its objective is preventing disease or its eradication wherever found. Though a disease-ridden animal industry would be a happy hunting ground, the veterinary profession works toward the elysium that only a healthy animal population can provide.

## III

Our veterinary profession has been daringly original in animal-disease control and the reward is an ample food supply that is capable of tremendous expansion when called upon; witness our food production for World War I and World War II. The shiploads of food now crossing the seas may be the deciding factor in the gargantuan conflict threatening our way of life.

## IV

The function of the veterinary profession is understandable. The raw material of human sustenance is the gift of gregarious herds, susceptible kindling for communicable infections, deadly, sweeping, stealthy, insidious, ever present and always ready to flare. Shelter and food are man's principal needs. It is as suicidal to neglect the one as to unwisely manage the other. Precisely to the same extent that fire departments prevent man's shelter from being swept away by flame, so does the disciplined veterinary service prevent his food from being abolished by disease.

## V

There is nothing more sensible now than to invite attention to the wise handling of health in man and animals. Undernourishment is a recognized threat to the existence of the occidental nations, a nemesis of unprecedented magnitude. Abundance of food produces a sense of security only among those who have not stopped to study the difficulties of keeping the main source of supply (farm animals) from being cut down or exterminated by disease.



## Albert T. Kinsley, B.Sc., M.S., D.V.S.

(1877-1941)

WHEN A. T. KINSLEY died at his home in Kansas City, December 8, 1941, the veterinary profession lost one of its most prominent members and the country a distinguished citizen. His professional life was 37 years of uninterrupted activity in behalf of veterinary medicine and full of achievement. Kinsley was a keen-minded, level-headed, far-seeing scientist who was never stampeded by the many passing fancies of the field he started to cultivate along with the pioneers — animal pathology. His earnest, unaffected interest in the students he taught won for him not only their undying admiration, but also that of the whole profession.

Dr. Kinsley was born at Independence, Iowa, February 26, 1877. He was graduated by the Kansas State College in 1899, won his master's degree at that institution in 1901, and took graduate work in bacteriology at the University of Chicago to round out his preparatory studies for a veterinary course at the Kansas City Veterinary College, where he obtained his doctorate (D.V.S.) in 1904. He served his alma mater as professor of pathology from the time of graduating until it was closed in 1918. He is the author of *Veterinary Pathology* (1910), *Diseases of Swine* (1914), *Swine Practice* (1920) and an endless list of contributions to the literature.

He was elected president of the AVMA at the Denver meeting in 1921 and of the Missouri Valley Veterinary Association in 1909, and was a continuous worker in his state and city societies. He represented his state in the House of Representatives



A. T. Kinsley

of the national association until 1940, when overtaken by ill health. In masonic circles he held life membership in Ararat Temple (AAONMS), the Oriental Consistory, and Temple Lodge (A.F.&A.M.), all of Kansas City.

In the commercial field, he was one of the early producers of anti-hog-cholera serum and virus (1909) and the founder of the Kinsley Laboratories (1908), where the first bacterins for use in animals were made in this country. Certain original technics in bacterin production created under his direction became generally accepted standards.

During his life, swine practice in the United States grew from practically nothing to one of the major branches of veterinary science and practice. His contributions to that unit of veterinary medicine were a gift of untold value to his country. Nothing in the veterinary-medical development of the Middlewest has been more constructive than the sound sophistry he expounded before veterinary associations throughout the country for many years—years of heated arguments, misunderstandings and unknowns during which Kinsley was usually found to be right. Kinsley is dead, but his work in behalf of veterinary science will live on.

The deceased is survived by his widow (née Anna Louise Smith of Burlington, Kan.) and his son, Albert Smith Kinsley, practitioner of law in Kansas City.

If anyone doubted the effectiveness of the new laws regulating the sale of drugs which increased the power of the Food and Drug Administration and the Federal Trade Commission, that doubt may now be dispelled, for, according to figures given in *The Journal of the American Medical Association*, the measure has increased the use of ethical and prescribed remedies and decreased the over-the-counter sale of patent medicines.

# CURRENT LITERATURE

## ABSTRACTS

### Screwworm Larvicides

Tests were made of 551 organic compounds in regard to the protection of wounds against screwworm infestation. Their toxicity to the larvae was compared with that of phenothiazine and rotenone. Of these, 284 had practically no toxic action at a concentration of 0.67 per cent, 190 killed all larvae at 0.17 to 0.67 per cent, and 77 reputed compounds killed larvae at a strength of 0.1 per cent or less. Ten of the latter were less effective than rotenone, 25 were its equal at 0.05 to 0.08 per cent, and 11 excelled phenothiazine at 0.03 per cent or less. The compounds found to be superior to phenothiazine were:

Cinchonine	Methylphenylnitro-
m-dinitrobenzene	soamine
2, 6-dinitro-4—	p-nitroanisole
chlorophenol	p-nitrophenetole
3, 5-nitro-o-cresol	p-nitrophenylace-
2, 4-dinitro-6—	tonitrile
cyclohexylphenol	

Quinoline and 16 of its derivatives were all highly toxic to the larvae, while but one from an amino group showed marked toxicity. [Bushland, R. C. *The Toxicity of Some Organic Compounds to Young Screwworms. Journal of Economic Entomology*, xxxiii (1940), pp. 669-676. Abstract, *E.S.R.*, Jan. 1941, p. 84.]

### Poultry, Patriotism and Profits

Secretary of Agriculture Claude Wickard was looking at the business end of loaded guns when he told farmers to step up poultry production, for there is a source of war matériel where the quickest return can be obtained with the greatest certainty. Frank Galor, in *Successful Farming*, introducing the theme with the three words of this headline, tells how the war has cut down egg laying in England from 12 million to 6 million cases per year. Besides the decrease being an example of the effect of war on food production, the involuntary curtailment of the home egg supply is a cue for the American farmers to step in and help the British.

Accepting the challenge, the American farmers expect to increase the 1942 yield of eggs by 10 to 11 million cases to make up the deficit. That the effort is not mere fancy was indicated by the large egg production during the

first eight months of 1941. The figure for August was 8,500,000 cases, the highest for that month since 1929, or 1 per cent higher for the ten-year average. Moreover, the feed-egg ratio has been held at a 25 per cent more favorable figure than last year. The August price was the highest since 1929. Eggs are pegged at 22 cents a dozen and poultrymen are assured an 85 per cent parity until the beginning of 1943.

The author urges farmers to avoid too much expansion of poultry-housing space and to coöperate with the government and cash in without needless additional expense, for when the war comes to an end there will be readjustments to make that may absorb more than the profits they made.

[Veterinarians in the poultry field have looked askance at possible crowding of poultry housing through the expansion of production without correspondingly expanding the space.] The author's answer to this tocsin is that a government survey has shown that a 15 per cent increase in poultry flocks can be made without that danger coming to pass. "Build if you need it for replacement of bad structures or for normal expansion, but avoid the urge to boom," is Galor's advice, which is an impressing analysis of the whole situation covering care, handling, feeding, housing capacity, and prospect of the present program. [Galor, Frank. *What the War Means to the Poultryman. Successful Farming*, Dec. 1941, pp. 28 and 42.]

### Swine-Practice Problems

Speaking of his territory (Iowa), the author names cholera, enteritis and erysipelas as the main swine-disease problems, but hesitates to put enteritis ahead of erysipelas since the latter is rapidly becoming a major issue. Practically speaking, four years ago erysipelas did not exist or was ignored. No attention was paid to a few large joints here and there.

In vaccinating against cholera on farms where pneumonia, bull nose, enteritis *et al.* have been prevalent, larger doses of serum are required, notwithstanding apparent recovery. The 50-lb. pig getting 35 to 40 cc. of serum should receive from 45 to 50 cc. on such farms. Tissue vaccine has given good results in "problem herds." It should not be used on droves

vaccinated with serum and virus during that season. Single doses conferred immunity for about six to eight months, and two-dose treatment for about a year. Pig scours, necrotic enteritis, coccidiosis and hemorrhagic dysentery are the four types of enteritides described. The treatment is mainly hygienic. Except that it is definitely infectious, the latter is an enigma. It is mentioned that nicotinic acid is recommended as a preventive of *Salmonella choleraesuis* infection by the Michigan station. Vitamins A and D in the feed have value in pig scours. Medication does not seem to help in hemorrhagic dysentery. Astringents (ferrous chloride, catechu, tannic acid) may be used in coccidiosis.

Salt poisoning is generally caused by feeding a mineral supplement containing a too high percentage of sodium chloride. The trouble is manifested by prostration, convulsions, hemorrhagic gastroenteritis and sometimes pulmonary edema. An abundance of water given by the mouth is the treatment. The author believes that latent erysipelas infection may break into the active form following the reaction of serum-virus vaccination. Serum treatment controls outbreaks, but on farms where the disease has become endemic the culture-serum vaccination is required. [Rosenfeld, Benjamin, D.V.M., Osage, Iowa. *Some Swine Practice Problems*. *Biochemic Review*, xii (Fall number, 1941) pp. 3 and 26.]

### Calcium of the Bones and Teeth

If a human adult does not consume 0.68 Gm. of calcium daily, he must draw upon the reserve of that element stored in the bones and teeth. Children need at least 1 Gm. daily and so does the expectant mother. Of phosphorus, the human adult and pregnant mother require 1.32 Gm. These cold figures indicate that the quart of milk per day for children and pregnant mothers advocated by dietitians is not overestimated, since the calcium of a quart of milk amounts to 1.15 Gm. and phosphorus 0.9 Gm. A pound of kale, a pound of spinach or three pounds of green string beans would have to be eaten to obtain the amount of calcium contained in a quart of milk.

It is erroneous to presume that since the short-lived animals cease to drink milk after weaning, man should do likewise. Man continues to grow long after weaning time and, therefore, needs milk throughout his longer period of growth, and he can ill afford to dispense with milk when adult. The metabolism of the bones and teeth goes on throughout life. [Irwin, Margaret, *Bulletin* 447, Wisconsin Agricultural Experiment Station.]

### The Vitamin A Reserve of Diseased Fowls

Since the work of Elvehjem and Neu (1932) on chicks, attention has been paid to vitamin A deficiency of fowls. The present authors set up experiments to determine the vitamin A units in the livers of fowls affected with various diseases (pullorum disease, fowl typhoid, coccidiosis, fowl pox, leucosis, worm parasites, *et al.*). Summed up, the results were that the carotene and vitamin A content of fowls so affected varies over a wide range—in fact, to such an extent that no correlation could be shown between any specific avian disease or parasitism and the store of these elements found in the liver. [Holland, V. B., Satterfield, G. H., Gauger, H. C., Holmes, A. D., and Tripp, F. *The Vitamin A Reserve of Diseased Fowls*. *Poultry Science*, xx (Nov. 1941), pp. 543-550.]

### Weil's Disease

Weil's disease (= icterohemorrhagic spirochetosis) is world wide. It affects man, dogs and rodents. Up to 1935, only twelve proved cases occurred in the United States. During the last five years the number has nearly doubled, and this probably represents but a portion of the cases, since some diagnoses may have missed. By means of an agglutination test the author diagnosed 40 new human cases, four of which were reported by physicians. The cases were widely distributed: New Haven to the north, New Orleans to the south, Reno to the west, and intermediate points. With some exceptions the 40 victims were occupied in some way with animals or in rat-infested places: butcher, farmer, garbage collector, poultryman, fish cutter, warehousemen, etc., four of whom died.

The author emphasizes that isolation of the organism (*Leptospira icterohemorrhagiae*) is possible only in fresh specimens of blood or urine of the patient by culture or animal inoculation. It must be differentiated from epidemic jaundice (= infectious hepatitis). Eighty-two such cases, although submitted at an early stage of the illness, gave negative agglutination tests and animal inoculations. In animals experimentally inoculated, *L. icterohemorrhagiae* is easily demonstrable microscopically in the circulating blood with dark-field illumination. It is, however, important not to confuse blood filaments and fibers with the organism. Details of the agglutination test, the declared purpose of the article, are described. The illustrated and tabulated article entitled "Canine Leptospirosis in the United States," by K. F. Meyer, B. Stewart-Anderson and B. Eddie of the Hooper Foundation, which gives a clear picture of the disease in dogs in this country, is not listed among the refer-



ences. Evidently the canine infection is not regarded as an important source of the human cases. [Packchianian, A. *Positive Agglutination Tests in Suspected Cases of Weil's Disease*. *Public Health Reports*, lvi (Nov. 1941), pp. 2145-2156.]

### The Horse on Wheels

The army horse is being taken for a ride in the literal sense of the term. Mechanized cavalry regiments with mounts loaded on trucks whisk along at the rate of 25 miles an hour—150 miles in a day, compared with the 25-mile jaunt of Jeb Stewart and Phil Sheridan, famous cavalymen of Civil War history. Cavalymen of the present American Army say that horses are now being used to greater advantage than ever before. The tank, armored car, motorcycle and scout car provide speed and striking power, but when there is work to do the horse is called upon, as in the days of old. Needless to say, motor cars and motorcycles can not make cross-country dashes. Their sphere is limited to roads, paths and trails, and only where the terrain is favorable. They are vulnerable to ambush and can not whirl out of danger. On the other hand, the mounted soldier has great motility off the beaten paths and, while vulnerable to small arms, he can quickly run to cover. The more ground his horse can cover, the better he can serve as the eyes of land forces. The American cavalry regiment consists of 1,600 officers and men, 574 horses, 300 motorized vehicles, the portées for the horses and a 4-ton truck. It carries supplies for two days: rations for the men, forage for the horses and fuel for the motors. The food for the men weighs 4 tons, forage about 8 tons and the fuel for the mechanized equipment, 28 tons. [*The Veterinary Corps Bulletin*, xxv (Oct. 1941), p. 323; credited to *The Reserve Officer*, Aug. 1941.]

### The First Line of Public Health

Under this title Dorothy Walker and Amy Schaeffer write a revealing story about the veterinary service in *Nation's Business*, the story of a group of earnest men whom the Prime Minister of Australia has recently called his "food army," meaning the veterinarians engaged in farmland practice. The importance of controlling disease in farm animals is well told all the way from curing a cow down with milk fever to the eradication of bovine tuberculosis, the handling of mastitis and brucellosis to chasing foot-and-mouth disease out of the country. The article relates the surge for admission in the veterinary schools, the long course to the D.V.M., the annual dearth of graduates, the prospects of private practice and official jobs, and the sorry plight of our people were there no veterinarians deployed

over the country to stamp out disease of farm animals and inspect the food produced from them.

It's a fascinating tale of how we qualify, what we do and what we make in dollars and cents. This survey revealed the irony of "Big animals, small pay; little animals, big pay." "His most important patients from the viewpoint of the nation's welfare," the authors declare, "bring him the least financial return and the greatest professional responsibility." [Walker, Dorothy, and Schaeffer, Amy. *The First Line of Public Health*. *Nation's Business*, Nov. 1941, pp. 31 and 62.]

### Synthetic Vitamins in Abortion

Threatened and habitual abortion (human) has been attracting increased attention, owing to the decreasing national birth rate. About 10 per cent of pregnancies end in abortion. The incidence is about 240,000 annually in the United States. Because criminal intent can not always be eliminated, the cause is not easy to analyze. The figure is a challenge to the obstetricians. Intrinsic disturbance in the fertilized ovum of maternal organism accounts for most of the spontaneous miscarriages.

The treatment of threatened abortion has been bed rest, sedatives, hormones and finally vitamins. Rest continues to be in order, barbiturates have replaced morphine for the sedation, and progesterone, thyroid extract and anterior pituitary-like sex hormone have been employed with varied results.

The authors employed synthetic vitamin E (=alpha-tocopherol acetate) in 15 threatened, 7 habitual and 10 previous abortions. In the threatened and previous groups 80 per cent delivered normal infants, while in the habitual group the percentage of success was 71.5. However, since the number of cases was not large, caution is necessary in weighing the value of vitamin E in these three classes of interrupted reproduction. [Lubin, Samuel, M.D., F.A.C.S., and Waltman, Richard, A.B., M.D., Brooklyn, N. Y. *The Use of Synthetic Vitamin E in the Treatment of Abortion*. *American Journal of Obstetrics and Gynecology*, cxli (June 1941), pp. 960-970.]

### Bovine Mastitis

In the United States 90 per cent of the mastitis is caused by *Streptococcus agalactiae*. It occurs in acute and chronic forms and is manifested by abnormal milk and indurations in the udder. Healthy udders may, however, carry the infection and break down "overnight," when resistance becomes lowered. The only way to find these animals is by the combined work of the veterinarian and the bacteriologist. With the proper aid the dairyman can reduce mastitis to the minimum, once the

specific cause has been determined. The thybromol, strip-cup and catalase tests are helpful along with the local physical examination. Properly instructed, the dairyman can become adept in the use of the thybromol test and thus aid in the control work. Badly affected animals are sold or segregated. Nonclinically affected animals should be stanchioned by themselves to prevent spreading the infection. Where laboratory methods are not employed, the Udall system of classification is practiced, namely: clean, suspects, and badly infected groups. The suspects are handled as if infected, until proved otherwise. Replacements should, if possible, be raised on the farm or new animals examined by a veterinarian.

The author gives specific, detailed directions on proper stable construction and sanitation, the use of the strip cup, the washing of udders, dipping teats, care of teat cups, and milking. The several treatments for mastitis recently described remain in the stage of experimentation. The directions, written for the edification of the layman, are helpful aids to the veterinarian in charge of control measures. [Hopson, George H., D.V.M. *Suggestions for the Prevention and Control of Bovine Mastitis. The De Laval Monthly, (Sept.-Oct. 1941), pp. 9 and 13.*]

### Length of the Intestines of Ruminants

The length of the small intestine of beef and dairy cattle is 28 and 33 times, respectively, the length from the withers and the pin bones. The length of the small intestine of eight beef cows measured ranged from 93 to 144 ft. and that of two dairy cows 144 and 172 ft. The length of the large intestine of the same animals ranged from 23 to 41 ft. for the beef breeds and 43 to 46 for the dairy cows. *U. S. Technical Bulletin 417 (1934)* gives the average length of the small intestine of steers 20 months old as 98 ft. In 32 similar steers 24 months old the small intestine was found to be 110 ft. long, a lengthening of 12 ft. The average length of the large intestine in this group was 21 ft.

There is a remarkable difference between the antemortem and postmortem lengths of the intestine of calves. The small intestine of a calf 6 months old was 21 ft., 2 in. *in vivo* and 68 ft., 9 in. *post mortem*. Similar variations in both the small and large intestine of calves 5, 9, 10 and 12 months of age were noted, although the difference was greatest in the small intestine. [Espe, D., and Cannon, C. Y., *Iowa State College. The Length of the Intestine of Calves and Its Bearing on the Absorption of the Nutrients from the Chyme. Journal of Dairy Science, xxiii (Dec. 1941), pp. 1211, 1214.*]

### Experimental Hexamitiasis of Poults and Chicks

Although previous work would indicate that parasites of the genus *Hexamita* are quite host specific, chicks can be infected with *Hexamita meleagridis* from poults, and *vice versa*. To establish the facts in this respect, the authors set up experiments regarding (1) the survival time of the infection, (2) efficient methods of inoculation, (3) the effect of passages on its virulence, (4) the natural infection by contact (picking up) of poults with chicks, and (5) of chicks with poults.

The original inoculum was obtained from intestinal scrapings and contents of poults acutely infected. The inoculum, which was abundantly loaded with the parasite, was introduced into chicks by various routes: orally, rectally, orally and rectally, by contact, and by giving them contaminated feed and water.

Since the parasite localizes mainly in the cecal tonsil [= ileorectal gland] and the bursa of Fabricius, these organs were examined *post mortem* at intervals. These studies showed that (1) *H. meleagridis* persisted in these organs as long as 22 weeks following inoculations made at the age of 1 week, (2) symptoms of enteritis were not produced by serial passages in chicks, (3) affected poults infect chicks by contact and (4) affected chicks (carriers) infect poults in the same manner, i.e., by picking up the infection. Summed up, the chicken must be considered a potential carrier of *H. meleagridis*. [McNeil, E., and Hinshaw, W. R. *Experimental Infection of Chicks with Hexamita Meleagridis. The Cornell Veterinarian, xxxi (Oct. 1941), pp. 345-350.*]

### Phenothiazine Toxic to a Thoroughbred

The subject was a Thoroughbred gelding, 6 years old, 16-1 hands, weighing 1,300 lb. in good flesh and apparent good health, excepting strongylosis. He received in the evening 65 Gm. of phenothiazine mixed with bran and oats after fasting since morning. Some of the dose was wasted by not having eaten all of the feed. The second and third days he drank water and ate some hay, but refused grain. The urine passed was almost black. His condition was not alarming until the fourth day, when he suffered from colic, his urine became extremely dark, pulse weak, temperature 101 F, and mucous membranes cyanotic and icteric. He was given an intravenous injection of citrated blood because his blood was dark. On the sixth day urinary irritation was manifested by repeated urination. The bladder appeared to be paralyzed. Only small spurts of urine were voided. The color of the urine was now light brown. On the seventh day edema of the nasal fossae and ventral surface of the neck

and abdomen had developed. The color of the blood and mucous membranes had improved, but the temperature rose to 104 F. On the eighth day the patient went down and was destroyed as hopeless.

The autopsy revealed enlargement of the heart, liver, kidneys and spleen. The histologic study, made at the Army Medical School, disclosed hemolytic jaundice, hemoglobinuria and hematuria which appeared to represent actions suggesting sensitivity to the drug. The low calcium and protein level of the forage may have had some influence. It consisted of prairie hay, Johnson grass, oats and bran. The authors do not regard the dose excessive.\* [Wolfe, Lt. Colonel William R., and Dennis, Lieut. Walter R., *Veterinary Corps Reserve. Toxemia Resulting from the Use of Phenothiazine. Army Veterinary Bulletin*, xxxv (July 1941), pp. 171-174.]

## BOOK NOTICES

### Handbook of Poultry Nutrition

A praiseworthy book, expedient, timely, in which the author, an experienced poultry specialist, undertakes to summarize the important and essential substance published to date on the alluring subject of poultry nutrition—in other words, the feeding of the barnyard fowl.

To the gleaner of veterinary literature here is a subject that is all messed up with scientific, near scientific and commercial notions which tend to confuse the unguarded reader. To iron out the confusion and the contradictions is a laudable task. This handbook is, therefore, a useful addition to the veterinarian's shelf. It is written for the edification of "All persons interested in poultry and poultry nutrition." Though the veterinarian is one of 13 groups named as prospective readers, he will be disappointed at the usual attempt to segregate nutrition from disease in the most disease-ridden branch of America's animal industry. The author is not blamed for following tradition, but the veterinary service has plans for making poultry production a reasonably profitable enterprise, by developing a better understanding and more coöperation between the poultry dietitian and doctor.

### BIBLIOGRAPHY

The 1,200 references which the author appends to the chapters give some idea of the magnitude of the literature on poultry nutrition and of the need of binding the salient facts and opinions on the subject between the covers of a book. In the long lists, extra-veterinary articles predominate to such a de-

gree as to prove that in poultry nutrition, veterinary and nonveterinary groups have worked in separate bailiwicks and have but rarely met. While, admittedly, economic factors have separated the poultryman from the veterinarian, veterinary journals of all countries have dwelt consistently on the subject. Artful dodging of facts about disease may seem wise in promoting the production of farm animals, but it only postpones the evil hour. Better to look diseases squarely in the face and eliminate them than to keep the producer unaware that enemies hiding in ambush may upset the mathematics of his feeding program.

### CHAPTERS AND ARRANGEMENT OF TEXT

There are 32 chapters with numerous subtitles which make reading easy. The entire field of nutrition is covered from bow to stern and nowhere are the general principles set aside. The eight chapters on vitamins are a veritable encyclopedia on the subject. There is a chapter each on feeding ducks, turkeys and game birds, and one on minerals, an 18-page glossary for the puzzled layman, a miscellaneous chapter on food assays and formulas, graphic tables of food components, relative values of every conceivable feed, and many attractive details too numerous to name here. The finale is a list of periodical publications which feature poultry: technical, semitechnical, commercial.

The book is designed primarily for the poultry and feed industries and the technician in those fields, but it neither sidesteps the dictates of science nor the path of reliability. Its topography is excellent and its illustration apropos. Those interested in the latest word on poultry nutrition will be delighted at the author's achievement. [*Handbook of Poultry Nutrition. By W. Ray Ewing, poultryman, manufacturer and lecturer. First edition. 840 pages, illustrated. Published by the author, Upper Monclair, N. J. Price \$7.50.*]

### What's New in Farm Science

Here is a booklet that lives up to its title as far as space permits. Of the seven subtitles, three (Livestock Feeding, Poultry, and Insect Pests) concern the veterinarian, although nothing contained is far removed from his line of work. Among subjects on crops of current interest in veterinary medicine are (1) hybrid corn, (2) hybridization of sweet clover to remove objectionable properties, especially coumarin, (3) hemp production on account of the war, (4) weed-killing chemicals and (5) the trench silo to store surplus crops. Built on a slope with good surface and subsoil drainage, silage covered with straw and 3-ft. of ground will "keep" for two or more years.

The poultry section brings out the known facts about (1) salt as a cure for cannibalism, (2) sulfur as a preventive of coccidiosis, (3)

\*Doses exceeding 45 Gm. are regarded as excessive by some equine practitioners.—Ed.



sunlight and manganese in the prevention of perosis, (4) milk and hatchability, (5) avitaminosis K, and other topics.

The sections on insect pests and plant diseases are another reminder of the debt owed to the entomologist and chemist.

The directory of the Wisconsin experiment staff shows 121 scientists engaged in the different departments (genetics, husbandry, economics, biochemistry, veterinary science, etc.). There are five veterinarians on the roster, namely: Beach (B. A.), Ferguson (L. C.), Hadley, Pouden and Wisnicky, all well-known figures in the field of science. [*What's New in Farm Science, Bulletin 451, Agricultural Experiment Station, University of Wisconsin. Paper. 112 pages. 1941. Price 15 cents.*]

### Los Angeles County Annual Livestock Report

The annual report of the Los Angeles county (Calif.) livestock department accents the responsibility of food production on an increasing scale in obedience to plans specified by the federal government, which animal husbandmen, veterinarians and livestock sanitary officials recognize as a paramount problem. Losses by death or lowered reproduction affect the national food-production program. To these ends the livestock, dairy and poultry industries of the country are doing their share, the author assures.

Tremendous importations of foodstuffs for animals which may contain infectious material have added to the department's work. Vesicular exanthema of swine declined below the incidence of the previous year, but in some instances the problem of control was complicated by the appearance of severe enteritis. Swine erysipelas appeared on two ranches. Hemoglobinurea and paratyphoid of cattle and calves claimed considerable attention. But for losses from predatory animals, sheepmen had a good year. Equine encephalomyelitis appeared unexpectedly in out-of-way places and caused 37 deaths during the summer; 3,175 horses were vaccinated. Poultry suffered the usual run of diseases, perhaps in a less degree of severity than usual. The loss from coccidiosis, for example, was but a fraction of that of a few years ago. Fur farming (fox, mink, chinchilla, rabbits) is a leading industry in Los Angeles county.

Owing to the large number of cattle brought into the county, tuberculosis-control work continued to increase. The county received 40,058 head of cattle during the year. Of these, 24,664 were from other states. The number of reactors was 306, or 0.88 per cent, which is 0.8 per cent higher than for the preceding fiscal year. Dairymen regard this work as equivalent to fire protection. The percentage of reactors removed by the federal-state intrastate testing was 0.187 per cent. Tabulated figures on this

program are given. Among 160 goats supplying milk in the county, there were no reactors.

The mine-run of diseases of cattle, sheep, swine and horses and measures in force to control them are described. The reader will be interested to know that California has the nation's largest saddle-horse population and that the county's three race tracks had to increase their stabling capacity to furnish accommodations for the instreaming Thoroughbreds, not to mention seating capacity for the patrons.

The book is an excellent compendium on livestock sanitation, and by far the most complete report of a local veterinary activity in this country. It reflects well-managed effort to protect and aggrandize the food supply of a large cosmopolitan population and its capital invested in utilitarian livestock. [*Annual Report of Los Angeles County Live Stock Department, 1940-1941. By L. M. Hurt, D.V.M., B.S.Agr., county livestock inspector, Los Angeles, Calif. Seventy 8" x 11" pages. Indexed.*]

### The Dog in the Show Ring

A 16-page booklet for veterinarians interested in the conduct and management of bench shows. It is based on the old proverb that all is not gold that glitters when dogs face the capable judge who likes style, action and appearance, but is not apt to be swayed away from the classical points of the breed. Beware of the pet which plays with the master and doesn't give the judge a ghost of a show to study the points that actually win the awards. "Let someone else show your pet" is good advice. Get your dog in good health, feed him well *en route* and at the show, know that his weight and size are right, and "let nature take its course" seems to be what Captain Judy is telling his readers in this new book of the Judy series of excellent publications on dogs and dogdom. The substance is summed up in 20 "Don'ts" all belonging in the upper cadre of good advice. "Good sportsmanship is always in order" is the parting shot. [*The Dog in the Show Ring. By Captain Will Judy. Judy Publishing Company, Chicago. 16-page booklet. Illustrated. Price 25 cents.*]

### Home Meat Curing Made Easy

This is a booklet describing the modern way to slaughter, dress, chill, pickle, smoke, tenderize, can, cook and serve the delectable meat of farm animals: pork, beef, lamb and poultry. The theme is good things to eat in abundance for the farm family. Home curing and canning are the sure way to set a good table and save money, the reader is reminded. It is only necessary to know how to transmute quality animals into quality food (ham, bacon, sausage,

corned beef and the other tantalizing products of the meat market).

Although the author's exposition and description are good, he fails to leave the impression that it is all very simple, for between the live animal and the dinner table there are admittedly many tricks for the hand of the expert and considerable science to be invoked.

For the farmer who slaughters his own animals for home use, *Home Meat Curing Made Easy* is a book not to glance through, but to study carefully in order to avoid the pitfalls of the art. The veterinarian who inspects meat and the housewife who does the cooking will find this a fascinating bit of reading and reference material. The fact that one of its purposes is to encourage the use of the publisher's products does not detract from its value. [*Home Meat Curing Made Easy*. 112 profusely illustrated pages, 10" x 8". Paper. Morton Salt Company, Chicago.]

### This Business of Carving

*This Business of Carving* is a book for every family circle, since the technic of carving is often tedious and not always well done. Whether it's turkey or duck, roast or steak, lamb, ham, venison or quail, not everyone performs the operation of carving without some degree of embarrassment, at least, not with the neatness and skill of Bill Rhode, who sets out to tell "How and Why to Carve at the Table" in an illustrated book giving directions on serving the contents of a platter without arousing suspicions of incompetence among the waiting gourmets.

The subject is a suitable one to review in a veterinary-medical journal because, in spite of all those inspections from farm to kitchen, the most delectable *pièce* can be all messed up by the awkward carver. Meat inspection, the veterinarian's large-scale province, does not end until the mouths are watering and the plates are served.

Carving should not be done in the kitchen and served on the omnibus platter or dished out on plates. The servings lose their savor and the event its elegance. There is more to eating than just filling the stomach. Mental atmosphere and looks as well as taste are considered in well-regulated families, the author implies, and rightly so, since the final evaluation of food is done at the dinner table.

The book tells in understandable terms how both ordinary and unusual meat foods of the average family should be carved and allocated to the guests. The necessary utensils and their uses are illustrated and described. The topography, pictures and binding are excellent. A book for you, the head of the family—the carver. [*This Business of Carving*. By Bill Rhode. 125, 5" x 8" pages. Illustrated. The Macmillan Company, New York, 1941. Price \$2.00.]



How to carve a turkey.

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# THE NEWS

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## Special Committee on Pan-American Veterinary Congress for 1943

Following the recommendation of President Wight at the Indianapolis session, the Executive Board and House of Representatives approved a proposal for a Pan-American veterinary congress to be held in conjunction with the Association's 1943 session at St. Louis.

President Jakeman has named the following special committee to make preliminary plans and arrangements:

John R. Mohler, *Chairman*, Washington, D. C.  
S. W. Haigler, St. Louis, Mo.  
R. A. Kelser, Washington, D. C.  
Ashe Lockhart, Kansas City, Mo.  
A. E. Wight, Washington, D. C.

With the ever-closer relationships that are developing in all fields of endeavor and the growing solidarity of Pan-American nations, a meeting of veterinarians from all countries in the Western Hemisphere can do much to effect better understanding of professional and scientific problems, veterinary education and methods of livestock disease control.

## Research Council Organizes

The Research Council, which was established at the Indianapolis session, held an organization meeting in Chicago on December 1, 1941. Twelve of the 14 members of this group were present: Temporary Chairman E. T. Hallman, W. E. Cotton, H. H. Dukes, M. A. Emmerson, James Farquharson, H. L. Foust, W. F. Guard, G. H. Hart, R. A. Kelser, M. L. Morris, C. F. Schlotthauer and E. A. Watson. Also in attendance were Executive Board Chairman O. V. Brumley, President H. W. Jakeman, Executive Secretary J. G. Hardenbergh and Editor L. A. Merrillat.

President Jakeman outlined the needs that had prompted his proposal to form the Council and suggested some principal functions which it might perform. [See J.A.V.M.A., October 1941, pp. 349-351.] He announced that three fellowship grants are already in hand or will be available as soon as the Council is ready to function and that there are excellent prospects of additional grants.

The following officers were elected for one-year terms: E. T. Hallman, chairman; R. A. Kelser, vice-chairman; and H. H. Dukes, secretary.

Rules of procedure were adopted and subcommittees were appointed to draft suitable forms of agreement between the AVMA and donors to the research fund, to receive applications and recommend the selection of fellows and the awarding of grants to institutions, and to draft informative material concerning the Council and its functions for distribution to interested persons and organizations.

The Council also determined its duties as an advisory editorial board for the American Journal of Veterinary Research. Below are the rules of procedure adopted.

1) The officers shall consist of a chairman, a vice-chairman and a secretary. These officers are to be elected at the regular annual meeting of the Council for a term of one year.

2) Vacancies which may occur in the membership of the Council will be filled as promptly as possible by the Board of Governors of the Association. Should it become necessary to fill any vacancy among the officers of the Council, same will be done by the Board of Governors pending the next meeting of the Council.

3) For the transaction of business, seven members present at a meeting shall constitute a quorum.

4) The regular annual meeting of the Council shall be held in Chicago at the time of the annual meeting of the United States Live Stock Sanitary Association.

5) Special meetings shall be held at the time and place of the annual meeting of the American Veterinary Medical Association, and at such other times and places as may be necessary and determined by the officers of the Council and approved by the Board of Governors.

6) To facilitate the transaction of business, the chairman shall appoint such standing and special committees as may be required.

7) Of the standing committees, there shall be one charged with the function of receiving applications for fellowships and making recommendations to the Council for the appointment of fellows, at specified institutions, and the making of grants. The chairman of the Council shall be chairman of this committee. The recommendations of this committee shall be made at any regular or special meeting of the Council, except that in cases where more immediate action is necessary, recommendations



may be considered and acted upon through correspondence between the chairman and members.

8) Scientific papers found by the editor of the American Journal of Veterinary Research to be appropriate for publication shall be referred to the member of the Council having the major interest in the subject. The member will return the paper to the editor within two weeks, together with his recommendation for acceptance or rejection. If rejection is recommended, the reasons therefor are to be stated. The editor will then notify the author as to whether the paper has been accepted or rejected. If rejected, and the author requests that rejection be reconsidered, then the paper will be returned to the chairman of the Council for action of the whole body.

9) In the transaction of business, a majority vote of the members present shall govern, except that to change the rules of procedure, a two-thirds vote of the members present shall be required.

#### Itinerary for AVMA Officers in January

With many invitations to represent the Association at meetings dated for the next few weeks, President Jakeman is faced with an unusually heavy schedule. It will be necessary for him to be *en route* for almost the entire month, attending the following state association meetings:

- Jan. 5-6: Kansas, at Wichita.
- 7-9: Ohio State, at Columbus.
- 13-14: Indiana, at Indianapolis.
- 15-16: New Jersey, at Newark.
- 22-23: Illinois State, at Springfield.
- 27-29: Iowa, at Des Moines.

In addition, Dr. Jakeman is scheduled to attend the Inter-Professional Conference in Des Moines during the latter part of January and the meeting of the Virginia State Veterinary Medical Association in Richmond, February 4-5.

President-Elect Dimock will represent the Association on the program of the Texas State Veterinary Medical Association in Fort Worth, January 15-16.

Executive Secretary Hardenbergh will go to the Pacific Coast early in January to appear on the programs of the California Veterinary Conference and the Dairy Industry Short Course at Davis, Calif., January 5-7. While in California he will confer with members of the Committee on Local Arrangements regarding plans for the 1942 AVMA convention scheduled for San Francisco in August. January 8-10 he will attend the annual meeting of the Inter-mountain Livestock Sanitary Association in Salt Lake City; January 27-28, the Ontario Veterinary Association meeting in Toronto; January 26-30, the Post-Graduate Conference for Veterinarians at Michigan State College, East Lansing.

#### A Proposal to Change the Method of Choosing Resident State Secretaries

It shall be the duty of each constituent association to elect one of its members as the resident state secretary at the stated meeting preceding the annual convention and to submit his name for the approval of the president-elect.

**Duties.**—The duties of resident secretaries are (1) to maintain a continuous liaison between the constituent and the national associations on all matters appertaining to the work of the veterinary profession, (2) to aid the executive secretary in promoting the welfare of the membership within his jurisdiction, (3) to assist in enlarging the membership and (4) to report news of general interest for publication, particularly new legislation pertaining to the veterinary service.

**Tenure.**—The term of office shall be two inter-convention years. The announcement of the election of resident state secretaries shall be made at each annual convention and published in the JOURNAL the first or second month following the annual convention.

Resident secretaries and foreign correspondents in territories not having a constituent association shall be appointed by the president-elect for a term of one inter-convention year.

#### Special Committee on Nutrition Appointed

At the meeting of the Executive Board in Chicago on December 2, 1941, a proposal was received for the establishment of a standing Committee on Nutrition. However, due to the fact that a standing committee can not be set up without a change in the administrative by-laws, the Board, after approving the proposal, authorized the appointment of a special Committee on Nutrition at once in order that there might be no delay in the functioning of such a group with respect to developing suitable material for AVMA convention programs, correlating the science and practice of feeding for the veterinary profession and supplementing desirable relationships with other groups in the field of nutrition.

President Jakeman has accordingly appointed the following special committee to serve until the Association can act at the next annual meeting on a proposal for a standing committee:

George H. Hart, *Chairman*, University of California, Davis, Calif.

Cliff D. Carpenter, Allied Mills, Inc., Fort Wayne, Ind.

H. C. H. Kernkamp, University of Minnesota, St. Paul, Minn.

M. L. Morris, New Brunswick, N. J.

Hubert Schmidt, Texas Agricultural Experiment Station, College Station, Texas.

## Activities of the Joint Committee on Foods

**Committee Meets in Chicago.**—The Joint Committee on Foods of the AVMA-AAHA met in Chicago on December 3, 1941. Data on foods under test for the seal of approval were reviewed along with the recommendations of the Advisory Scientific Council pertaining thereto. One food was found not acceptable for the seal and the Committee authorized suggestions to be sent to the manufacturer as to methods of improving the formula if the food is to be re-submitted.

A plan was approved to conduct the practical feeding tests under the direct supervision of the Committee. To this end, a unit is to be established which will permit controlled and detailed observations of feeding trials on dogs and special tests to ascertain nutritional results.

Two new companies have applied for the seal and the committee has arranged for tests of the products to be started.

**Discontinuance Notice.**—On and after December 10, 1941, the seal of approval is to be discontinued on K.F.S. canned food and K.F.S. Cero-Meato, manufactured by the Kennel Food Supply Company of Fairfield, Conn. These products will no longer appear on the list of approved foods. Both have been on the list since it was first published and it is regretted that the company has found it necessary to discontinue at this time.

**List of Approved Foods.**—The manufacturers and foods now authorized to use the seal are: Albers Milling Co. (Carnation Co.)—Friskies; Ballard and Ballard—Insurance Dog Food; Chappel Bros.—Ken-L-Ration and Ken-L-Bis-Kit; Hill Packing Co.—Hill's Dog Food; W. K. Kellogg Co.—Gro-Pup.

**The New Seal of Approval.**—Below is a reproduction of the seal now issued to manu-



facturers whose products have been tested and the results found acceptable by the Advisory Scientific Council and the Committee.

This seal signifies (1) that the foods so identified have been subjected to critical examinations comprising chemical and biological assays and practical feeding tests on dogs, (2) that the results of these tests have been carefully reviewed by unbiased authorities, (3) that the seal has been granted only to those foods with satisfactory tests and (4) that the manufacturer has agreed to restrict label and advertising claims to proved facts.

**Summarized Analysis of Survey.**—During July 1941, an official survey was conducted by the Joint Committee on Foods. The subject on which information was sought is of interest primarily to practitioners, particularly those engaged in small animal practice.

The questionnaire was mailed to 1,290 practitioners throughout the United States and Canada. Six hundred and forty-five replies were received. A preliminary tabulation of results was displayed at the food committee's exhibit at the Indianapolis convention. An analysis of these replies revealed interesting facts that should be made available to the profession. Therefore, in the following article, the first of several on this subject to appear in the JOURNAL, the questionnaire is reproduced and the replies are classified. This should serve as an introduction and as a basis for subsequent publications.

### TABULATION OF SURVEY

**Question 1.**—Do you believe that the testing and approving of dog food is a program which will enable the veterinary profession to render valuable service to the dog-owning public?

Number answering .....	623
Yes .....	574
No .....	49

**Question 2.**—Do you believe that inspection and approval of dog food is a veterinary problem?

Number answering .....	626
Yes .....	569
No .....	57

**Question 3.**—What criticisms or suggestions do you have?

Number answering .....	527
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Valuable opinions were voiced to this question. A résumé will appear subsequently.

**Question 4.**—What brand or brands of commercial dog food were fed in your hospital or clinic in 1940?

Number answering .....	621
Number of brands used.....	125

Of the 125 brands used, ten received the

largest number of votes. Of these ten, six had the seal of approval and four did not.

**Question 5.**—Do you sell any commercial dog food?

Number answering .....	633
Yes .....	208
No .....	425

**Question 6.**—What commercial dog foods did you recommend to your clients: (a) during 1940? (b) prior to 1940?

Number answering .....	612
Brands recommended prior to 1940.....	69
Brands recommended during 1940.....	79

The following indicates the approximate percentage of increase during 1940 in the use of or recommendation by veterinarians of foods bearing the seal of approval:

Food 1 .....	300%
Food 2 .....	175%
Food 3 .....	150%
Food 4 .....	102%
Food 5 .....	101%

These data indicate a marked increase in the use or recommendation of foods bearing the seal of approval.

**Question 7.**—What proportion of dog food used in your practice during the past year was: (a) commercially prepared? (b) fresh products mixed by you?

Number answering .....	595
71 used 100% commercially prepared food	
82 used 75% commercially prepared food	
109 used 50% commercially prepared food	
38 used 100% fresh mixed products	
107 used 50% fresh mixed products	
80 used 25% fresh mixed products	
49 used 10% fresh mixed products	

Six and four-tenths per cent of the 595 used freshly prepared dog foods exclusively.

This indicates a wide preference by veterinarians for at least some commercially prepared products for feeding dogs.

**Question 8.**—The Committee on Foods contemplates a greatly enlarged veterinary inspection of the plants and ingredients of dog-food manufacturers. Would you be interested in being assigned to handle a portion of this work?

Veterinarians answering .....	592
Yes .....	287
No .....	305

Many of the veterinarians answering "no" to this question indicated that their location is such that it would be inconvenient for them to cooperate in the work.

To obtain information on the comparative incidence in dogs of canine distemper, internal parasites and nutritional diseases, the following question was included:

**Question 9.**—What is the frequency of occurrence—in the order 1, 2, 3—of the following diseases in your practice?

Canine distemper	
Internal parasites	
Nutritional diseases	

Replies were received in six groups of orders. The summary of these findings is as follows:

Number answering .....	608
Nutritional diseases first.....	265
Internal parasites first.....	204
Canine distemper first.....	139

According to these data nutritional diseases constitute the No. 1 cause of illness among dogs in the United States and Canada. Internal parasites are a close second.

The Committee wishes to take this opportunity of expressing appreciation to those veterinarians who cooperated in this survey and assisted in making the data available.

### Correction

On page 328 of the October 1941 issue of the JOURNAL, R. L. Anderes was incorrectly listed as a member of the Board of Tellers who conducted the election of the president-elect at the Indianapolis session. It was L. E. Andres, not R. L. Anderes, who participated in this work.

### Special Committee of Executive Board to Study Distribution and Utilization of Veterinary Services

At the meeting of the Executive Board in Chicago, December 2, 1941, consideration was given to the problem of insufficient veterinary services in certain areas of the country, ways and means of correcting the situation, and the corollary problem of greater utilization of practitioners in official disease-control work conducted by the federal and state bureaus of animal industry. To study these problems a special committee of the Board was appointed by Chairman Brumley comprising J. L. Axby, chairman, W. E. Cotton and Ashe Lockhart.

### Twelfth International Veterinary Congress Prize

Chairman Jakeman of the Committee on Twelfth International Veterinary Congress Prize urges the participation of all AVMA members in nominating candidates for the Twelfth International Veterinary Congress prize for 1943.

In 1934, when the Twelfth International Veterinary Congress was held in New York City, a considerable sum of money was raised in the United States to entertain the delegates. Inasmuch as part of this sum was not spent, the Congress authorized the AVMA to establish this as a permanent fund and to divert the interest therefrom into a yearly award based on distinguished service to veterinary science and the livestock industry. Accordingly, this award is made at each annual convention of the Association.

Nominations should be submitted, not later than June 1, 1942, either directly to Dr. H. W. Jakeman, 44 Bromfield St., Boston, Mass., or to the central office of the AVMA.



## APPLICATIONS

### *Rules Concerning Applications for Membership (Quoted from the Administrative By-Laws):*

Candidates for membership shall present an application to the executive secretary on a special form approved by the Board of Governors. The form shall state the applicant's race, name, age, education, year of graduating and work in which he is engaged. It shall contain the endorsement of two members, one of whom shall live in the same state, province or territory as the applicant.

Notice of all applications shall be published in the JOURNAL for two successive months. The first notice shall give the applicant's full name, year of graduation, post office address, and the names of his endorsers. The applicant shall be declared elected and so notified 30 days after the second notice has been published, provided no objection to his election has been filed in writing. Objections to an applicant's election shall be subject to the action of the Executive Board. A rejected applicant may present his defense to the Executive Board through the House of Representatives.

### First Listing

CLARKE, HOWARD E.

909 Fifth St., Petaluma, Calif.

D.V.M., State College of Washington, 1935.

Vouchers: L. R. Libby and Rod C. McCornack.

CROUSE, ARTHUR EDWARD

Box 201, Puyallup, Wash.

D.V.S., Kansas City Veterinary College, 1911.

Vouchers: M. O. Barnes and T. R. Myers.

HALVERSON, ORVILLE J.

Station Veterinary Hospital, Presidio of San Francisco, Calif.

D.V.M., State College of Washington, 1938.

Vouchers: Howard Carroll and Wilbert C. Nichols.

KIRBY, JOHN TOM

2421 S. Shepherd Drive, Houston, Texas.

D.V.M., Texas A & M College, 1938.

Vouchers: H. Schmidt and R. D. Turk.

LIVINGSTON, ALAN A.

49 E. Bayview Ave., Great Neck, N. Y.

D.V.M., Cornell University, 1937.

Vouchers: H. A. Lustvack and Robert Ferber.

MOFFAT, GEO. COLVIN

5732 W. Cermak Rd., Cicero, Ill.

B.V.Sc., Ontario Veterinary College, 1941.

Vouchers: James R. Merrick and J. G. Hardenbergh.

SIMKINS, H. R.

Elmwood, Ill.

M.D.C., Chicago Veterinary College, 1910.

Vouchers: L. A. Merillat and J. G. Hardenbergh.

SINCLAIR, LUKE R.

1775 Broadway, San Francisco, Calif.

D.V.M., Michigan State College, 1938.

Vouchers: Wm. H. Boynton and F. W. Wood.

VOTAW, FLOYD

236 N. L St., Tulare, Calif.

D.V.M., University of the Philippines, 1940.

Vouchers: John L. Tyler and L. M. Hurt.

### Second Listing

Baglina, A., Casilla 537, Santiago, Chile.

Blank, Lee A., 2611 Agatite Ave., Chicago, Ill.

Canto, J., Casilla 16, Puerto Aysen, Chile.

Cornejo, Mario, Echaurren 429, Santiago, Chile.

Eschenbacher, Albert B., Stockyard Station, Denver, Colo.

Finch, Dell C., 3235 Gough St., San Francisco, Calif.

Gilmore, James W., 1622 Oxford St., Berkeley, Calif.

Inman, Marvin L., 3024 Baker St., San Francisco, Calif.

Leigh, L., Barros Arana 970, San Bernardo, Chile.

Ross, S. M., 1828 E. Third St., Williamsport, Pa.

## U. S. GOVERNMENT

### Rank of Brigadier General Proposed for the Veterinary Corps

On December 15, 1941, Representative Gillie of Indiana introduced a bill into the House of Representatives—H. R. 6240—which provides that in addition to the assistants to the Surgeon General authorized by law, there shall be an assistant with the rank of brigadier general who shall be an officer of the Veterinary Corps.

### Army Veterinary Service

**Regular Army.**—Announcement is made of the acceptance by the President of the resignation by Captain Edwin L. Millenbruck, Fort Sill, Okla., of his commission as an officer of the Army.

Major George T. Price is relieved from present assignment and duty at Fort Bragg, N. Car., effective on or about November 22, 1941, and is assigned to the fourth corps area service command with station at Camp Shelby, Miss.

Lt. Colonel Daniel S. Robertson is relieved from present assignment and duty at Fort Bragg, N. Car., effective on or about December 8, 1941, and is assigned to Fort Sam Houston, Texas.

Lt. Colonel Charles S. Williams is relieved from present assignment and duty at Fort Sam Houston, Texas, and assigned to duty with the

*Annual Banquet*

**NATIONAL ASSOCIATION OF BUREAU OF ANIMAL INDUSTRY VETERINARIANS**

**Hotel La Salle, Chicago, December 4, 1941**



West Coast Air Corps Training Center, Moffett Field, Calif.

Colonel Jean R. Underwood is relieved from Letterman General Hospital, Presidio of San Francisco, Calif., and is assigned to duty at Fort Bragg, N. Car.

**Veterinary Corps Reserve.**—First Lieut. Henry J. Lindenstruth is relieved from assignment and duty at the San Francisco General Depot, Fort Mason, Calif., effective on or about November 20, 1941, and assigned to the Charlotte Quartermaster Depot.

Captain Robert L. Alkire is relieved from present assignment and duty at Langley Field, Va., effective on or about November 22, 1941, and is assigned to Fort Bragg, N. Car.

Announcement is made of the promotion to the grade of captain of the following first lieutenants in the Veterinary Corps Reserve, now on active duty, with date of rank indicated opposite their names:

Louis E. Stanton, October 30, 1941.  
George H. Zacherle, October 30, 1941.  
George M. Wilson, November 3, 1941.  
Marion W. Scothorn, November 4, 1941.  
Russell M. Madison, November 7, 1941.  
Culver W. Rippetoe, November 7, 1941.  
Horace R. Willard, November 7, 1941.  
Garrett H. McNay, November 13, 1941.  
Stanley L. Hendricks, November 14, 1941.  
Charles E. Robinson, November 24, 1941.

Announcement is made of the temporary promotion of First Lieut. Olin A. Anderson to the grade of captain, with rank from November 25, 1941.

The following officers of the Veterinary Corps Reserve, now on extended active duty at the stations indicated, have been ordered to report to the commanding officer, Chicago Quartermaster Depot, Chicago, Ill., for temporary duty for a period of 30 days for the purpose of pursuing a course of instruction, commencing on November 24, 1941, in the inspection of meat, meat-food and dairy products, under the depot veterinarian. Upon completion of this duty each of the officers (first lieutenants unless otherwise indicated) will return to his proper station:

Captain Fred I. Hamman, Fort Bliss, Texas.  
Peter J. Germanio, Camp Polk, La.  
Robert W. Day, Camp Wheeler, Ga.  
Arthur L. Tellejohn, Camp Forest, Tenn.  
Clinton D. Barrett, Advanced Flying School, Victoria, Texas.  
Edward L. Marston, Fort Banks, Mass.  
Martin Kadets, Fort Preble, Maine.  
Karl E. Putnam, Pine Camp, N. Y.  
Benjamin L. Walbert, Indiantown Gap, Pa.  
Darrell S. Steele, Fort Benjamin Harrison, Ind.

Albert J. Brandehof, Fort Knox, Ky.  
Walter B. Prendergast, Chicago Quartermaster Depot, Chicago, Ill.

Wallace V. Hornbacker, Chicago Quartermaster Depot, Chicago, Ill.

Albert L. Havlik, Fort Leonard Wood, Mo.  
Clark E. Burt, Fort Leavenworth, Kan.  
Truman B. Fleener, Fort Sam Houston, Texas.  
William I. Mendenhall, Camp Roberts, Calif.  
George M. Wilson, Camp Callan, Calif.  
Robert L. Jimison, Fort Niagara, N. Y.

### BAI Transfers

Roy Avant from Tuscaloosa, Ala., to Albany, Ga., in charge of meat inspection.

John M. Bowman from Oklahoma City, Okla., to Olympia, Wash., on tuberculosis.

Robert D. Bullock from Waterloo, Iowa, to Sioux City, Iowa, on meat inspection.

David H. Carter from Jackson, Miss., to Dubuque, Iowa, on meat inspection.

Charles M. Chase from Omaha, Neb., to Denver, Colo., on meat inspection.

Wm. F. Dorgan from Columbus, Ohio, to Cincinnati, Ohio, on meat inspection.

Oliver D. Grace from Bismarck, N. Dak., to Richmond, Va., on tuberculosis.

Curtis I. Harkins from Austin, Minn., to Richmond, Va., on meat inspection.

Edward Hinsel from Cleveland, Ohio, to Kansas City, Kan., in charge of meat inspection.

Ross L. Jewell from Topeka, Kan., to Little Rock, Ark., on Bang's disease.

Clarence G. Merriman from Olympia, Wash., to Omaha, Neb., on meat inspection.

Gerald H. McChesney from Atlanta, Ga., to Ottumwa, Iowa, on meat inspection.

Archie N. McGregor from Kansas City, Kan., to Chicago, Ill., in charge of meat inspection.

Donald B. Radloff from South St. Paul, Minn., to Waterloo, Iowa, on meat inspection.

Glen H. Randall from Moultrie, Ga., to Richmond, Va., in charge of meat inspection.

Garrett W. Riley from Albany, Ga., to Moultrie, Ga., in charge of meat inspection.

Milton R. Sharp from Denver, Colo., to Olympia, Wash., on tuberculosis.

Winston R. Tornow from Jefferson City, Mo., to Boston, Mass., on Bang's disease.

Glenn B. Van Ness from Little Rock, Ark., to Jefferson City, Mo., on Bang's disease.

Arthur J. Wahn from Richmond, Va., to Cleveland, Ohio, in charge of meat inspection.

Floyd E. Wilson from Jacksonville, Fla., to Tuscaloosa, Ala., in charge of meat inspection.

**Retirements.**—Charles F. Payne, Chicago, Ill.; John W. Taggart, Kansas City, Kan.

### Farm Products Inspection Act

The Farm Products Inspection Act went into effect October 1, 1941. It provides rules and regulations for grading, labeling, sampling and packaging butter, cheese, eggs, poultry, dressed domestic rabbits and other items, under the supervision of the Agricultural Marketing Service. The *Federal Register* of July 23, containing full information, can be obtained from the Superintendent of Documents, Washington, D. C. Price 10 cents.



## Closing Gaps Against Foot-and-Mouth Disease

Chief Mohler of the BAI has issued a warning to all concerned to be on the lookout for infected garbage that may be landed from the many British warships coming into American ports for repair, or other purposes, some of which dock at remote places. The watch is for unauthorized removal of garbage from such ships. "You should communicate with the nearest Bureau station on the coast in order that no place where such ships have put in is overlooked," is the chief's decree.

## Medical Department to Hold Symposium on Army Nutrition

Nutrition in the Army is the subject of a symposium for Medical Department reserve officers to be held in New York City, January 13. The scheduled participants are Colonels Samuel A. Cohen and H. I. Teperson of the Medical Corps, Major Louis Griesman of the Veterinary Corps and Lieut. Col. Milton I. Strahl, M. C. Res., of the Sanitary Corps Reserves. The program, which will include exhibits on army nutrition, is under the supervision of Lieut. Col. Wm. C. Lippold, M. C., U. S. A., who is chief of the medical section of the 2nd Corps Area.

## Fladness Goes to Argentina and Chile

By arrangement with the governments of Argentina and Chile, S. O. Fladness, chief of the Field Inspection Division, USBAI, left for a visit to those countries on December 13 to obtain first-hand information on the livestock and animal-disease situation.

Observation will be made particularly in the southern part of South America, including the Island of Terre del Fuego, parts of which lie in both Argentina and Chile.

Dr. Fladness was selected as being specially qualified for the assignment because of previous residence in Argentina, his long experience in the administration of animal quarantines, and his familiarity with the Spanish language.

The survey will deal largely with the existence of foot-and-mouth disease in the regions mentioned. The visit also will provide the opportunity to exchange official information on other veterinary matters.

## Food-for-Freedom Program

The part played by the U. S. Bureau of Animal Industry in speeding up food production was analyzed by Chief John R. Mohler, in "Information for the Press" under date of December 17, 1941. Summarized, the effort comprised (1) more research on diseases of farm animals, (2) further progress in the improvement of breeds and types of domestic animals, including poultry, and more efficient breeding, (3) continued coöperation in the National Poultry Im-

provement Plan, particularly reduction of losses from pullorum disease, (4) the eradication of livestock diseases through coöperation between federal and state veterinary services and the livestock industry, (5) keeping out by rigid quarantine such livestock maladies as foot-and-mouth disease, surra, rinderpest *et al.*, (6) veterinary supervision of imported hides, wool, feed, etc., (7) curtailing losses from brucellosis through federal-state plans of control, (8) intensifying investigation on encephalomyelitis of horses, scabies of sheep and cattle, hog cholera and various parasitic diseases, and (9) expanding the meat-inspection service.

## AMONG THE STATES

### California

"Chewing Disease."—A neurosis of horses known as chewing disease is reported to have broken out among horses in the Sacramento Valley, particularly in Butte, Colusa, Contra and Sacramento counties. The disease is manifested by champing the jaws, facial and mandibular paralysis, and edema of the lips, nose and cheeks. The affection is a lingering one that often leads to starvation. Its relation to equine encephalomyelitis is being studied by the Division of Animal Industry of the California state department of agriculture.

### Canada

Quebec Veterinary Association.—The Quebec Veterinary Association met at Sherbrooke, Que., on September 13, 1941.

Dr. Robinson of Brockville, Ont., was the chief surgeon at a clinic held in the morning under the coöperative direction of the Association, the eastern townships veterinarians and faculty members of the veterinary school at Montreal university.

The afternoon session was devoted to lectures.

Dr. Rajotte, president of the Association, officiated at the banquet and dance. A. E. Cameron, veterinary director general of the Dominion of Canada, was the guest speaker.

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There are now five veterinarians on the faculty of agriculture at Macdonald College, McGill University. C. V. Barker (Ont. '41) occupies the position of College veterinarian while taking part-time graduate studies in parasitology. L. D. Woolsey (Ont. '41) is studying for a Master of Science degree in nutrition, with chemistry and parasitology as minor subjects. L. Choquette (Mont. '39) is on the staff of the Institute of Parasitology and will complete the requirements for a Master of Science degree in parasitology and nutrition in 1942. T. W. M. Cameron, D.Sc., M.R.C.V.S., is professor of parasitology and director of the Insti-

tute of Parasitology, and W. E. Swales (Ont. '30) holds the position of animal pathologist, Dominion Science Service.

## Iowa

**Midwest Small Animal Association.**—The fourth annual meeting of the Midwest Small Animal Association, held at Burlington, November 6, 1941, drew an attendance of 71.

E. A. Benbrook of Iowa State College, Ames, presented a paper on "Newest Methods in Parasite Diagnosis and Treatment" which he illustrated with laboratory equipment, charts listing the 84 parasites of dogs and cats, and a comprehensive series of slides. Dr. Benbrook also demonstrated the technic for fecal examinations, euthanasia by electrocution and post-mortem technic in dogs.

Otto Stader of Ardmore, Pa., demonstrated the butterfly bandage for bilateral dislocation of the hip, various bandaging for other dislocations and the technic for correcting difficult ones. He was assisted by W. H. Riser of Des Moines, H. G. Dow of Fort Madison and C. L. McGinnis of Peoria, Ill.

At the banquet, Dr. Stader told the history of the Stader splint with motion pictures, showing the benefits of the device in human, canine and feline fractures.

Motion pictures also were shown of the life history of the dog tick and equine encephalomyelitis in the Bitter Root Valley.

The question box and round table discussion brought out important points for veterinarians in large animal practice who desire to give improved service to small animals.

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**Cedar Valley Association.**—Thirty-nine veterinarians from 15 Iowa counties were in attendance at a dinner meeting of the Cedar Valley Veterinary Medical Association held at Black's tea room in Waterloo, November 10, 1941.

M. W. Osburn of Independence and Lester Proctor of Hazleton prepared the program. President C. L. Moles of Dike turned the meeting over to Dr. Osburn, who introduced A. H. Ward of Independence. Mr. Ward spoke on "The Problems of a Hatcheryman," pointing out that hatcherymen who persist in trying to supplant the veterinarian in the treatment of poultry diseases are not lessening the poultry-disease problem and that the hope of the industry lies in veterinary efforts to curb the losses from poultry diseases.

P. V. Neuzil of Blairstown led the discussion of Mr. Ward's paper and pointed out the difficulties encountered by practitioners in controlling infectious poultry diseases even when the best spirit of coöperation exists between the hatcheryman and the veterinarian.

Carl H. Erbe of the Iowa State Teachers' College faculty, Cedar Falls, spoke on "Gov-

ernment." He pleaded for more intelligent voting and laws fitted to present needs.

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**Iowa State College Clinics.**—The two clinics (hospital and ambulatory) of Iowa State College cared for 17,364 animals in 1940. This figure breaks down as follows: hogs, 6,195; dogs, 4,621; cattle, 4,143; horses, 1,023; sheep, 863; cats, 233; miscellaneous, 102. The latter included caged birds, monkeys, rabbits, skunks and groundhogs. The animals afford sound, practical experience for students.—*C. H. Covault as quoted by Mason City Globe Gazette.*

## Illinois

**Horse and Mule Association.**—The twenty-second annual meeting of the Horse and Mule Association of America was held in Chicago, December 3, 1941. Members from 24 states were in attendance. T. A. Sigler of Greencastle, Ind., represented the AVMA officially.

It was emphasized that of the 6,096,799 farms in the United States, only 1,409,635 have tractors. In other words there are 4,687,114 farms operated with horse and mule power. [If to the latter figure there were added those farms using both tractors and horses, the number using tractors alone would fade into small figures.]

Major General John Kerr, chief of cavalry, U. S. Army, spoke on the wide use of horses in the Russian and German armies and the greater use of them in the new army of the United States.

Farmer-Banker Frank Hoffman of Iowa cited specific cases wherein farmers relying solely on horses were better off financially than those depending upon mechanical power.

## Maine

**Maine State Association.**—The regular quarterly meeting of the Maine Veterinary Medical Association was held in Lewiston, October 22.

The feature of the program was a Professor Quizz session conducted by P. R. Baird of Waterville. Dr. Baird had assigned questions to a number of the members present and these questions were answered briefly.

C. F. Davis of Rumford was asked how to eliminate barn odor on clothes and the family car, but was unable to give what he considered a satisfactory answer.

C. M. Merrill of South Paris was asked, "Does a veterinarian hold a lien on animals treated by him and when does this lien take priority over a mortgage?" To the first part of the question Dr. Merrill replied in the affirmative under the Maine law and under the common law, but that no such lien is in effect without possession of the animal treated.

The question: "Are field tests for mastitis reliable?" was asked A. E. Coombs of Skowhe-

gan. Dr. Coombs replied that field tests in general are not very satisfactory, but that he does place reliance on the laboratory tests of milk samples submitted to a local commercial laboratory.

J. F. Witter of Orono reported on the use of phenothiazine in veterinary practice and encouraged the veterinarians to have available supplies of this drug and directions for its use for the control of sheep parasites.

E. E. Russell of Farmington was not able to suggest a completely satisfactory treatment for sweet corn poisoning in cattle. He uses calcium gulconate injections with fair results.

E. C. Moore of Lewiston discussed feline distemper and infectious enteritis and reported favorable results from the use of homologous antiserum given in two doses in quick succession accompanied by the intraperitoneal injection of dextrose to replace normal feeding.

C. L. Ryan of Dexter discussed anaphylactic shock from the use of hemorrhagic septicemia bacterin, particularly where this bacterin contained the cultural media in which it was prepared. P. R. Baird and M. E. Maddocks sustained this point with some of their own experiences.

M. E. Maddocks was asked, "Is calcium deficiency more or less common than usual and is acetoneuria often associated with the following . . . ?" He replied, "Acetoneuria in my experience is not commonly associated with milk fever. Many cases of calcium deficiency do not respond satisfactorily to calcium gluconate or to the calcium gluconate and dextrose mixtures. The animal either fails to recover to the point that it gets on its feet or it goes down again following the treatment." E. C. Moore replied that magnesium deficiency may complicate some of these cases. P. R. Baird added that in his experience chloral hydrate often helps in the recovery and M. E. Maddocks continued this with the statement that chloral hydrate apparently has improved the condition of the cow and increased the milk production to the extent that the farmer wanted to continue using it after the cow had recovered. A. E. Coombs suggested the subcutaneous injection of calcium gluconate to prolong its action in addition to the intravenous injection.

L. B. Denton, junior veterinarian of the BAI, formerly associated with the state Bang's disease-testing laboratory, was asked, "In your opinion does any physiologic condition of cattle have an influence on the Bang's test." He replied, "No stage of pregnancy or condition of heat will influence the test, except that chronic suspects may possibly react at parturition."

An additional feature of the quiz program was a telephone conversation between S. W. Stiles, representing the veterinarian, and R. E. Ingham, representing the client. The conversa-

tion was as follows: "A dog has been run over in front of my house. Don't know who the owner is. Would you take care of the animal?"

Dr. Stiles replied: "I would take the case and find the owner. I would never refuse to take the dog." C. M. Merrill said, "I do not assume any responsibility in such cases, but turn it over to the town and let them decide." Most of the veterinarians agreed it best to assume responsibility for first aid in accident cases.

"How much do you charge to spay a 5-month-old dog?"

Reply, "Ten dollars."

"Why do you charge more than Dr. Jones?"

Reply, "Why does Dr. Jones charge less than I do?"

There were many other questions in this vein and the conversation concluded with: "Does my dog have worms?" It skids along the ground and keeps rubbing itself. Isn't that a sign of worms?"

Dr. Stiles quickly replied, "Yes, it may be a sign of worms, but it is also a very good way a dog has of scratching itself."

Following the quiz program G. M. Potter gave a report on the sessions of the House of Representatives at the Indianapolis convention of the national association.

A. J. Neal of Bangor reported on the large animal clinic of the AVMA meeting. Then P. R. Baird entertained the group with movies and the meeting adjourned.

J. F. WITTER, *Secretary*.

## New Jersey

The Del High Veterinary Association met at the farm of one of its members, John Case, in Clinton, October 14, 1941. A group of 25 members from Pennsylvania and New Jersey witnessed a demonstration by M. A. Emmerson of the School of Veterinary Medicine, University of Pennsylvania, on a method of examining the genital organs of mares for disease and suturing the vulva.

A demonstration of the pregnancy test using white rats was given by James Varley of E. R. Squibb & Sons, New Brunswick. In a tour of the Case farm following the demonstration, keen interest was shown in the horse-breeding program and methods in vogue for collecting pregnant mare's urine.

R. A. HENDERSHOTT.

## Pennsylvania

The Pennsylvania Biological Research Foundation of Philadelphia has a division devoted exclusively to the study of goat's milk from the human health standpoint. The president of the division is Walter A. Roach. Goat's milk is rated higher than cow's milk on various counts. The dairy-goat division of the Founda-



tion has set out to establish the not-too-clear scientific facts involved.

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**Philadelphia Society of Stomatology.**—The Philadelphia Society of Stomatology held its first meeting of the season at the School of Veterinary Medicine, University of Pennsylvania, September 30. The session was preceded by a banquet at which three members of the veterinary faculty were guests.

The program comprised a talk by W. J. Lentz on comparative dental pathology, the showing of colored slides depicting x-ray therapy of oral diseases of animals, a demonstration by E. L. Stubbs and H. Martin of pathological diseases of the oral cavity of animals, a demonstration of repelling a molar in a horse by W. J. Lee, and an exhibition of radiography of the teeth of animals by M. A. Emmerson.

### Wisconsin

**Southeastern Association.**—The Southeastern Wisconsin Veterinary Association, in session at Columbus on October 16, elected Arthur Boesewetter of Jackson as president; Ray Klusendorf of Columbus, vice-president; J. O. McCoy of Reeseville, secretary; and George Gettelman of Hartford, treasurer.

Conrad Elvehjem of the University of Wisconsin was the guest speaker; his subject, "Utilization of Vitamins as They Pertain to the Veterinary Profession."

This association held another meeting at Watertown on November 4, with 65 veterinarians in attendance. Evert Wallenfeldt and W. D. Pouden, both of the state university, were the speakers of the evening. Dr. Wallenfeldt, an extension specialist, discussed the Wisconsin quality program in dairy products as presented to grade-school pupils throughout the state. Dr. Pouden spoke on "Research in Connection with the Mastitis Program and Its Utilization by Men in the Field."

J. S. HEALY, *Resident Sec'y.*

• • •

The annual cheese production of the United States is about 700 million pounds, of which Wisconsin produces one half. "More has been written about cheese during the past few weeks," says *Hoard's Dairyman*, "than in any comparable period in all history." The cheese factories (there is one at every crossroads) of the state are busy supplying the greatly increased demand. While cheese making is quite a large industry in the United States, it is small when compared with the total population. Our *per capita* consumption is but 5 to 6 lb. It is slightly lower than that of Britain (9 lb. per person). The Swiss eat 23 lb. per person, the French, Danes and Dutch, around 14 lb. each, every year.

**Hog-Cholera Vaccination.**—Failure to properly vaccinate hogs against cholera not only results in spreading the disease, but exacts an immediate and future toll from hog owners.

This fact was demonstrated in several recent instances in which farmers purchased hog-cholera virus and administered it themselves in violation of the Wisconsin statutes. The disease spread and infected the premises to such an extent that it will be necessary to vaccinate all hogs on those farms for several years. The statutes provide that hog-cholera virus should be administered only by qualified veterinarians. . . . Farmers who have any suspicion of hog cholera should immediately consult a qualified veterinarian.—*State Veterinarian V. S. Larson as quoted in Keno-sha (Wis.) News.*

## COMING MEETINGS

American Association for the Advancement of Science. Dallas, Texas. December 29, 1941-January 3, 1942. (AVMA representative: Ward Giltner, Michigan State College, East Lansing, Mich.)

Kansas Veterinary Medical Association, Wichita, Kan. January 5-6, 1942. Chas. W. Bower, secretary, 1128 Kansas Ave., Topeka, Kan.

Arkansas, Mississippi and Tennessee associations (joint annual meeting). Memphis, Tenn. January 5-7, 1942. Communications should be addressed to John H. Gillmann, 769 Vance Ave., Memphis, Tenn.

California Veterinary Conference (under joint sponsorship of California State Veterinary Medical Association and University of California). Davis, Calif. January 5-8, 1942. Further information may be secured from C. M. Haring, Division of Veterinary Science, University of California, Berkeley, Calif.

University of Pennsylvania Conference for Veterinarians. University of Pennsylvania, Philadelphia, Pa. January 6-7, 1942. G. A. Dick, dean, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pa.

Wisconsin Veterinary Medical Association. Madison, Wis. January 6-7, 1942. B. A. Beach, secretary, University of Wisconsin, Madison, Wis.

Cornell University Annual Conference for Veterinarians. New York State Veterinary College, Ithaca, N. Y. January 7-9, 1942. W. A. Hagan, dean, New York State Veterinary College, Ithaca, N. Y.

Ohio State Veterinary Medical Association. Columbus, Ohio. January 7-9, 1942. R. E. Rebrassier, secretary, The Ohio State University, Columbus, Ohio.

Minnesota State Veterinary Medical Association. Minneapolis, Minn. January 8-9, 1942. H. C. H. Kernkamp, secretary, University Farm, St. Paul, Minn.

Intermountain Livestock Sanitary Association. Salt Lake City, Utah. January 8-10, 1942. D. E. Madsen, acting secretary, Utah State Agricultural College, Logan, Utah.

Vermont Veterinary Medical Association. Hotel Vermont, Burlington, Vt. January 10, 1942. G. N. Welch, secretary, Northfield, Vt.

Oklahoma Veterinary Medical Association. Oklahoma City, Okla. January 12-13, 1942. F. Y. S. Moore, secretary, Box 485, McAlester, Okla.

Rhode Island Veterinary Medical Association. Narragansett Hotel, Providence, R. I. January 13, 1942. J. S. Barber, secretary, 260 Pleasant St., Pawtucket, R. I.

Indiana Veterinary Medical Association. Severin Hotel, Indianapolis, Ind. January 13-15, 1942. Charles C. Dobson, secretary, New Augusta, Ind.

New Brunswick Veterinary Association. St. John, N. B. January 14, 1942. L. S. Doyle, registrar, Moncton, N. B.

New Jersey, The Veterinary Medical Association of. Hotel Douglas, Newark, N. J. January 15-16, 1942. J. R. Porteus, secretary, P. O. Box 938, Trenton, N. J.

South Carolina Association of Veterinarians. Columbia, S. Car. January 20, 1942. R. A. Mays, secretary, State Office Bldg., Columbia, S. Car.

Texas State Veterinary Medical Association. Fort Worth, Texas. January 20-21, 1942. M. B. Starnes, corresponding secretary, City Health Dept., Dallas, Texas.

Illinois State Veterinary Medical Association. Springfield, Ill. January 22-23, 1942. C. C. Hastings, secretary, Williamsville, Ill.

Michigan State College Post-Graduate Conference for Veterinarians. East Lansing, Mich. January 26-30, 1942. Ward Giltner, dean, Division of Veterinary Science, Michigan State College, East Lansing, Mich.

Ontario Veterinary Association. Toronto, Ont. January 27-28, 1942. Jean M. Rumney, acting secretary-registrar, 612 King St. W., Hamilton, Ont.

Alabama Polytechnic Institute Annual Conference for Veterinarians and Alabama Veterinary Medical Association. Auburn, Ala. January 27-29, 1942. I. S. McAdory, secretary, Alabama Polytechnic Institute, Auburn, Ala.

Iowa Veterinary Medical Association. Des Moines, Iowa. January 27-29, 1942. C. C. Franks, secretary, Grimes, Iowa.

North Carolina Short Course for Veterinarians. North Carolina State College, Raleigh, N. Car. January 27-30, 1942. A. A. Husman, chairman, Short Course Committee, 320 Agricultural Bldg., Raleigh, N. Car.

\*Virginia State Veterinary Medical Association. Hotel John Marshall, Richmond, Va. February 4-5, 1942. E. P. Johnson, secretary, Virginia Agricultural Experiment Station, Blacksburg, Va.

Louisiana Veterinary Medical Association. Louisiana State University, Baton Rouge, La. February 18-19, 1942. C. M. Heflin, secretary, 2130 Tulip St., Baton Rouge, La.

Colorado State College Short Course for Veterinarians. Colorado State College, Fort Collins, Colo. February 23-26, 1942.

## PERSONAL NOTES

### Birth

To Dr. (O.S.U. '36) and Mrs. Carleton W. Schwiesow of Ripon, Wis., a son, November 14, 1941.

### Activities

W. M. Long (A.P.I. '41) has opened a practice in Burlington, N. Car.

Glen S. Bolton (Colo. '41), formerly of Longmont, Colo., has opened a hospital in Albuquerque, N. Mex.

William E. Jones (Cin. '15) of Leesburg, Ohio, was elected to the board of education of the Leesburg Highland schools in November 1941.

F. W. B. Smith (Ont. '16) has been appointed district inspector for the Province of British Columbia, Dominion Health of Animals Branch, succeeding the late W. H. McKenzie.

A. Henry Craige, Jr. (U.P. '32), formerly instructor in physiology at the School of Veterinary Medicine, University of Pennsylvania, is now affiliated with the Pitman-Moore Company, Indianapolis, Ind.

Frank D. Blohm (Iowa '32), formerly engaged in laboratory work on brucellosis at the Animal Disease Station, U. S. Bureau of Animal Industry, Beltsville, Md., has accepted a position as assistant professor of veterinary pathology at Iowa State College, Ames, Iowa.

O. J. Hummon (O.S.U. '31), formerly with the Animal Disease Station, U. S. Bureau of Animal Industry, Beltsville, Md., has taken the position vacated by F. D. McKenney (Colo. '28) at the Fur Animal Disease Research Laboratory conducted jointly by the federal Fish and Wildlife Service and the College of Veterinary Medicine, State College of Washington, Pullman, Wash.

\*In the December 1941 issue (page 524), this meeting was announced, in error, as "Virginia Conference for Veterinarians. Virginia Polytechnic Institute, Blacksburg, Va."

## DEATHS

**B. K. Baldwin** of Nutley, N. J., died on December 12, 1941.

Dr. Baldwin was graduated from McGill University in 1898.

**Philip Ritter** of Gashland, Mo., died on October 23, 1941.

Dr. Ritter was graduated from the Kansas City Veterinary College in 1908 and joined the AVMA in 1909.

**E. W. Huenefeld**, 55, of Brillion, Wis., died on November 7, 1941.

Dr. Huenefeld was born at Watertown, Wis., in 1885 and was graduated from the Chicago Veterinary College in 1906. He had practiced at Brillion for 21 years.

**Walter G. White** of Lansdowne, Pa., died on November 25, 1941.

Dr. White was born at Coleraine, Pa., February 20, 1871, and was graduated from the University of Pennsylvania in 1909. He joined the AVMA in 1927.

**E. C. Goodrich** of Kalamazoo, Mich., died on November 15, 1941.

Born at Bristol, Vt., July 8, 1878, Dr. Goodrich was graduated from the Grand Rapids Veterinary College in 1915. He joined the AVMA in 1916.

**E. E. Ruebush** of Washington, D. C., died on October 25, 1941.

Born at Dayton, Va., March 7, 1897, Dr. Ruebush was graduated from the U. S. College of Veterinary Surgeons in 1924. He joined the AVMA in 1935.

**Lt. Colonel Will C. Griffin** of the Veterinary Corps, U. S. Army, died at the Indianapolis City Hospital, Indianapolis, Ind., on November 5, 1941.

Colonel Griffin was born at Cheyenne, Wyo., January 23, 1891, and was graduated from the Kansas City Veterinary College in 1912. After serving in the U. S. Army as an assistant veterinarian from 1917 to 1920, he was commissioned a first lieutenant in the Veterinary Corps, and promoted through the grades, attaining the grade of lieutenant colonel on August 3, 1937.

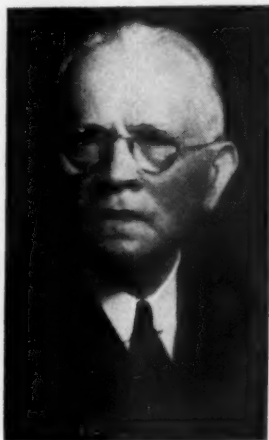
His military career took him to all parts of the United States and the Philippines. He also served with the American forces in Germany from April 1921 to June 1922. In 1936, he completed the post-graduate course at the Army Veterinary School, Washington, D. C. At the time of his death Colonel Griffin was on leave, pending retirement on December 31, 1941.

Colonel Griffin joined the AVMA in 1916.

**John P. Turner** died of double pneumonia on December 7, 1941, at the Walter Reed Hos-

pital, Washington, D. C., where he had been a patient for two weeks.

Born at Marshalton, Chester county, Pa., September 10, 1870, Dr. Turner was graduated from the University of Pennsylvania in 1890 and a few months later was appointed an



John P. Turner

Army veterinarian and assigned to the 6th U. S. Cavalry, serving with that regiment in important Indian campaigns. After resigning from the Army in 1898, he became inspector in the U. S. Bureau of Animal Industry for a few months and then joined the department of health of the District of Columbia as a dairy-farm inspector. At the

same time, he engaged in general practice in Washington, and continued in practice there until about a year ago. During this period he served as veterinarian to the U. S. Soldiers' Home and to St. Elizabeth's Hospital, also a government institution. Dr. Turner was especially interested in cattle practice and was quite proficient in that branch of veterinary medicine. For ten years prior to its close in 1918, he was professor of veterinary medicine in the veterinary school at George Washington University.

Dr. Turner continued to be interested in improving the position of Army veterinarians after he left the service. As a member of the Committee on Legislation of the AVMA he took an active part, first with Dr. Huidekoper and later with Dr. Hoskins, in the effort to induce Congress to pass a law granting commissioned rank to Army veterinarians, a struggle which extended over a period of several years, terminating successfully in 1916. In World War I, Dr. Turner was a major in the Veterinary Corps and, as general veterinary inspector of the cantonments and other posts in the eastern area of the United States, he had an important part in the organization and training of the veterinary units at these stations. In 1923, he was commissioned a lieutenant colonel in the veterinary reserve corps. He contributed an interesting chapter to Merrillat and Campbell's Veterinary Military History on his experience in the Army during the '90s and in the World War.

Dr. Turner joined the AVMA in 1891.

L.A.K.-W.M.M.

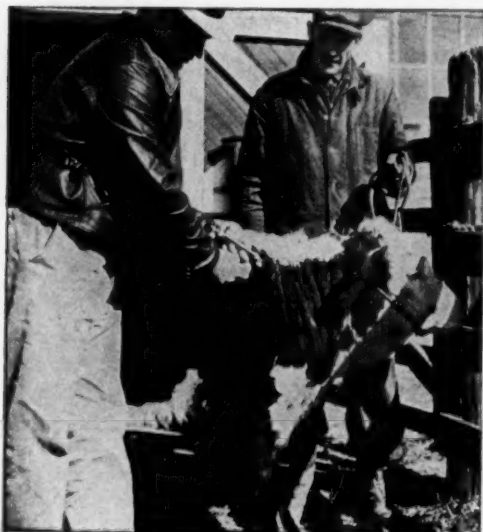


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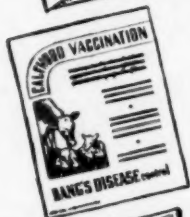
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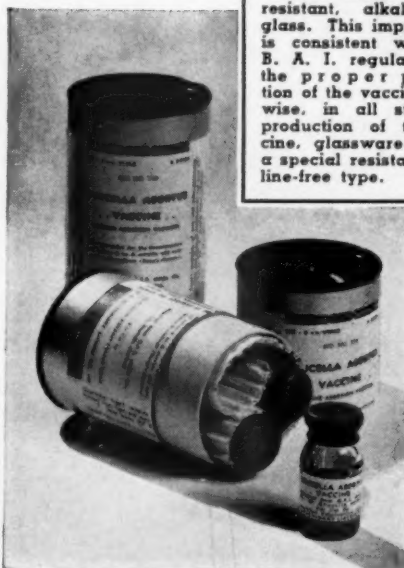
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